Report of the National Type Evaluation Program (NTEP) Committee

Jim Truex
Chief
Ohio Department of Agriculture, Weights and Measures

Reference
Key Number

500 INTRODUCTION

The National Type Evaluation Program (NTEP) Committee (hereinafter referred to as "Committee") submits its report for consideration by the 91st National Conference on Weights and Measures (NCWM). This consists of the Interim Report presented in NCWM Publication 16 as amended in the Addendum Sheets issued during the Annual Meeting that was held July 9 - 13, 2006, in Chicago, Illinois. The Committee considered communications received prior to and during the 91st Annual Meeting that are noted in this report.

Table A identifies the agenda items in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Committee's Interim Meeting Agenda. A voting item is indicated with a **"V"** after the item number or, if the item was part of the consent calendar, by the suffix "**VC**". An item marked with an **"I"** after the reference key number is an information item. An item marked with a **"W"** was withdrawn by the Committee and generally will be referred to the regional weights and measures associations because it either needs additional development, analysis, and input or does not have sufficient Committee support to bring it before the NCWM. Table B lists the appendices to the report, and Table C provides a summary of the results of the voting on the Committee's items and the report in entirety.

This report contains many recommendations to revise or amend National Conference on Weights and Measures (NCWM) Publication 14, Administrative Procedures, Technical Policy, Checklists, and Test Procedures or other documents. Proposed revisions to the publication(s) are shown in **bold face print** by ~~**striking out**~~ information to be deleted, and **underlining** information to be added. Requirements that are proposed to be nonretroactive are printed in *italics***.**

Note: The policy of NIST is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as they were submitted and may, therefore, contain references to inch-pound units.

Table A
Index to Reference Key Items

Table B
Appendices

Table C
Glossary of Acronyms*

BIML	Bureau of International Legal Metrology	IR	International Recommendation
CD	Committee Draft[1]	MAA	Mutual Acceptance Arrangement
CIML	International Committee of Legal Metrology	OIML	International Organization of Legal Metrology
CPR	Committee on Participation Review	PTB	Physikalisch-Technischen Bundsanstalt
DD	Draft Document[2]	R	Recommendation
DR	Draft Recommendation[2]	SC	Subcommittee
DV	Draft Vocabulary[2]	TC	Technical Committee
DoMC	Declarations of Mutual Confidence	WD	Working Document[3]

[1] CD: a draft at the stage of development within a technical committee or subcommittee; in this document, successive drafts are numbered 1 CD, 2 CD, etc.

[2] DD, DR, DV: draft documents approved at the level of the technical committee or subcommittee concerned and sent to BIML for approval by CIML.

[3] WD: precedes the development of a CD; in this document, successive drafts are number 1 WD, 2 WD, etc.

* Explanation of acronyms provided by OIML.

Table D
Voting Results

Reference Key Number	House of Representatives		House of Delegates		Results
	Yeas	Nays	Yeas	Nays	
500 (Report in Its Entirety) Voice Vote	**All Yeas**	**No Nays**	**Al Yeas**	**No Nays**	**Passed**

Details of All Items
(In Order by Reference Key Number)

1. Test Data Exchange Agreements

Background/Discussion: This item was included on the Committee's agenda in 1998 to provide an update on NTEP's work to establish bilateral and multilateral agreements. Under such agreements and arrangements, manufacturers would be able to submit their equipment to any of the participating countries for testing to OIML-recommended requirements. The resulting test data would be accepted by other participants as a basis for issuing each country's own type approval certificate. Following is a report on the three types of test data exchange agreements:

Mutual Acceptance Arrangement (MAA): NTEP Director, Stephen Patoray, attended an MAA Seminar for Assessors September 5 - 6, 2005. During this seminar, Mr. Patoray provided the attendees an overview of the additional requirements in the United States for both OIML R 76 and R 60. He updated the attendees at the 2006 NCWM Interim meeting regarding the current status of the MAA and other developments. The next scheduled meeting of the Committee on Participation Review (CPR) for R 76 and R 60 was held on March 7, 8, and 10, 2006, in Sydney, Australia.

The NTEP Committee discussed this item during the fall 2006 NTEP Committee meeting. Based on previous input from the NCWM membership and other discussion on this topic, the NTEP Committee believes the United States should be a Country A (issuing participant) with full laboratory capabilities for OIML R 76 "Non-automatic weighing instruments" and should not participate in a Declaration of Mutual Confidence (DoMC) as a Country B (utilizing participant) for R 76. However, the NTEP Committee recognizes that currently there are no identified resources available to be able to move forward with a laboratory for R 76 at this time. Based on this fact and given the realities of the NIST Force Group's position to not participate as a testing laboratory for OIML R 60 "Load cells", the NTEP Committee recommended that the NCWM Board of Directors consider signing the DoMC as a Country B for R 60 "Load cells" only.

The MAA is also in the NCWM Board of Directors' Committee Report.

Summary: During the 2006 NCWM Interim Meeting, the full NCWM Board carefully considered this issue and the recommendation of the NTEP Committee. Significant discussion was held on this issue with the primary focus on the desire to become a utilizing member (Country B) for the DoMC that will cover OIML R 60 load cells. Significant comments also came from the full membership during the 2006 NCWM Interim Meeting open hearings on this issue. In addition, a very large group attended a late evening meeting on this topic. The participants in this meeting asked many important questions and demonstrated a high level of interest in the NCWM's direction regarding MAAs. The NTEP Committee would like to acknowledge and thank this group of participants for their significant contributions in discussing this issue.

The decision of the Board was to accept the recommendation of the NTEP Committee and indicate the intention of signing on as a utilizing member of the DoMC for OIML R 60 Load Cells. The NCWM Board indicated no interest at this time in being a utilizing participant for OIML R 76 "Non-automatic weighing instruments (NAWI)." The intent is to investigate various alternatives and determine if a laboratory can be established that will allow NCWM to be an issuing participant in the DoMC for OIML R 76. It was clearly stated that this laboratory would have to be "viable" and that NCWM must fully understand the effect such a signing may have on NTEP, existing NTEP labs, and our standards development process in NCWM. It was also stated that it is not clear at this time if funding for such a laboratory is available.

Bilateral Agreements: No additional discussions have been held on this topic pending the outcome of the MAA discussions.

NTEP-Canada Mutual Recognition Program: No additional areas of MRA activities have been identified.

2. Adoption of Uniform Regulation for National Type Evaluation by States (URNTE)

Background/Discussion: The Scale Manufacturers Association (SMA) has hosted NTEP adoption and implementation meetings for state directors at each regional weights and measures association conference. These meetings enable jurisdictions to share information about adopting and implementing NTEP in their respective jurisdictions, encourage non-NTEP jurisdictions to adopt the regulation, and allow current NTEP jurisdictions to share ideas on how to make enforcement more effective and uniform among the states. The meetings also provide NTEP management with information related to areas in which the operation and implementation of the program can be improved. Several questions have been posed at these meetings about issues associated with NTEP interpretation or practice. Comments from 1997 to 2005 have been summarized, without attribution and are available for review and download on the SMA website at http://www.scalemanufacturers.org.

During the most recent NCWM Annual Meeting, SMA Representative, Darrell Flocken, indicated SMA decided it would be more useful to show which states require NTEP certificates before allowing weighing and measuring devices to be certified as legal for trade regardless of their adoption of the NIST/NTEP URNTE. SMA developed a new map that shows that status. SMA, deciding that it would be more useful to show which states require Voluntary Registration of Service Agencies and Service Personnel (VRSA) regardless of their adoption of VRSA, developed separate maps that show that status. Such maps are available for review and download on the SMA website at http://www.scalemanufacturers.org.

Mr. Flocken will update the attendees on any future additional developments in this area. Based on comments from the NCWM membership, the NTEP Committee will make a final decision to discontinue this item from the NTEP report.

Summary: The NTEP Committee wishes to acknowledge and thank SMA for all of the work they have and continue to put into this item. The updated maps will be available on the SMA website for all to review. Based on comments from the NCWM membership, it was the decision of the NTEP Committee to discontinue reporting on this item as part of the NCWM Interim and Annual Meeting report agendas.

This item will be dropped as a standing item from future NTEP Committee agendas.

3. NTEP Participating Laboratories and Evaluations Reports

At the 2006 NCWM Interim Meeting, Stephen Patoray, NTEP Director, updated the Committee on NTEP laboratory and administrative activities since October 1, 2003. A report of NTEP Laboratory Activities was distributed at the 2006 NCWM Interim Meeting.

The NTEP weighing and measuring laboratories held a joint meeting in April 2006 in Annapolis, Maryland. The NTEP weighing laboratories also met September 25, 2005, before the meeting of the Weighing Sector in Columbus, Ohio. The NTEP measuring laboratories also met October 21, 2005, prior to the Measuring Sector meeting in Nashville, Tennessee.

The date and location of 2007 meeting of the NTEP Laboratories is to be determined.

Summary: During the 2006 NCWM Interim Meeting, the NTEP Director, Steve Patoray, reported that the number of the authorized NTEP labs has not changed within the last year. He also indicated that the NTEP Committee and he are watching the backlog at the NTEP laboratories closely. At the present time, the backlog at the NTEP laboratories has returned to more historical levels, after a period of months at a much higher level. Comments from the floor indicated interest in continuing to improve the length of time to complete an NTEP evaluation. It was noted, based on some random internal audit information provided by the California NTEP laboratory that a significant portion (up to 50 % of the total time) of the time spent during an evaluation may be due to delays by the manufacturer. There could be several factors, but lack of preparedness by the applicant, slow responses to laboratory inquiries, and need to correct device deficiencies lead to significant delays in completing an evaluation. The NTEP Committee will continue to monitor the laboratory backlog and also attempt to find additional solutions to improve the time to compete a device evaluation.

NTEP Director, Steve Patoray provided the Committee with the following updated report of the NTEP Laboratory and administrative activities from October 1, 2005 to June 2006.

NCWM Activity Report

Activity: NTEP

Date: June 13, 2006 **Submitted By: NCWM Staff**

NTEP Application Statistics:	2004-2005 10/1/04 - 6/13/05	2005-2006 10/1/05 - 6/7/06	Grand Total 10/1/00 - 6/7/06
Total Appls. Processed (Reactivations)	(2) 198	173	(49) 1403
Applications Completed	53	67	1097
New Certificates Issued:	131	185	1322
Certificates Distributed to State Directors	134	197	1312
Certificates Posted to Web Site	134	183	3857
Current Active NTEP Certificates:			1579
Time for NCWM to assign an evaluation:		Avg.: 8 days	Median: 8 days
Time for NCWM to review a draft CC:		Avg.: 8 days	Median: 6 days
Time for complete evaluation:		Avg.: 145 days	Median: 115 days

Upcoming meetings:

- Grain Analyzer Sector – August 23 - 24, 2006, Kansas City, Missouri
- Weighing Sector – September 26 - 28, 2006, Annapolis, Maryland
- Software Sector – October 18 - 19, 2006, Annapolis, Maryland
- Measuring Sector – October 20 - 21, 2006, Annapolis, Maryland

4. NTETC Sector Reports

The Committee heard an update on the activities of the National Type Evaluation Technical Committee (NTETC) Sectors at the 2006 NCWM Interim Meeting. Outlined below is a brief summary of Sector activities since the 2005 NCWM Annual Meeting.

Grain Analyzer Sectors: The NTETC Grain Analyzer Sector held a joint meeting in Kansas City, Missouri, August 24 - 25, 2005. A draft of the final summary was provided to the Committee prior to the 2006 NCWM Interim Meeting for review and approval.

The next meeting of the Grain Analyzer Sector is tentatively scheduled for August 2006 in Kansas City, Missouri. For questions on the current status of Sector work or to propose items for a future meeting, please contact the Sector technical advisors:

Diane Lee
NIST WMD
100 Bureau Drive – Stop 2600
Gaithersburg, MD 20899-2600
Phone: (301) 975-4405
Fax: (301) 975-8091
e-mail: diane.lee@nist.gov

Jack Barber
J.B. Associates
10349 Old Indian Trail
Glenarm, IL 62536
Phone: (217) 483-4232
e-mail: jbarber@motion.net

Measuring Sector: The NTETC Measuring Sector met October 21 - 22, 2005, in Nashville, Tennessee. A draft of the final summary was provided to the NTEP Committee prior to the 2006 NCWM Interim Meeting for review and approval.

The next meeting of the Measuring Sector is scheduled for October 2006 in conjunction with the Southern Weights and Measures Association's Annual Meeting. For questions on the current status of sector work or to propose items for a future meeting, please contact the Sector technical advisor:

Richard Suiter
NIST WMD
100 Bureau Drive – Stop 2600
Gaithersburg, MD 20899-2600
Phone: (301) 975-4406
Fax: (301) 975-8091
e-mail: rsuiter@nist.gov

Weighing Sector: The NTETC Weighing Sector met September 25 - 27, 2005, in Columbus, Ohio. A final draft of the meeting summary was provided to the Committee prior to the 2006 NCWM Interim Meeting for review and approval.

The next Weighing Sector meeting is scheduled for September 2006 in Annapolis, Maryland. For questions on the current status of Sector work or to propose items for a future meeting, please contact the Sector technical advisor:

Steven Cook
NIST WMD
100 Bureau Drive – Stop 2600
Gaithersburg, MD 20899-2600
Phone: (301) 975-4003
Fax: (301) 975-8091
e-mail: stevenc@nist.gov

NTETC Sector Summaries: The NTEP Committee received copies of the summaries prior to the 2006 NCWM Interim Meeting for their review and approval. Past NTETC Sector summaries are available upon request from NCWM and the NIST technical advisor:

NCWM Inc. or
Phone: (240) 632-9454
e-mail: ncwm@mgmtsol.com

NIST WMD Technical Advisor, Steven Cook
(See contact information above)

Summary:
The NTEP Committee reviewed the recommendations of the Weighing, Measuring and Grain Analyzer Sectors. The recommended changes, based on the final summary reports of these sectors, were accepted by the NTEP Committee. The NTEP Committee instructed the NTEP director to amend NCWM Publication 14 accordingly and granted editorial privilege to the NTEP director.

In addition, the NTEP Committee heard that progress has been made by the work groups on the checklists for both Multiple Dimension Measuring Devices (MDMD) and Automatic Weighing Systems. The NTEP Committee accepted a recommendation from the NTEP director that these updated checklists, even though still in draft form, be placed in the current edition of NCWM Publication 14. The draft checklists will be used by the labs and reviewed by all applicants so that final comments can be received and these checklists may be finalized. It was noted that both the MDMD and the AWS work groups would need to meet again to finalize the changes to the appropriate checklists.

The NTEP Committee reviewed an *ad hoc* procedure for the evaluation of a device with an option for radio frequency communication. This brief checklist will be utilized to evaluate any devices that come into the NTEP labs with that option. This item was be reviewed by the NTEP labs at their April 2006 meeting and will also be reviewed by the 2006 NTETC Weighing and Measuring Sectors for further input.

Steve Patoray reported that the previous year's Sector reports can be found on the NCWM website. He also reported that, if contacted, he could supply anyone interested with all previous Sector reports.

5. NTEP Participation in U.S. National Work Group on Harmonization of NIST Handbook 44, NCWM Publication 14 and OIML R 76 and R 60

The Secretariat for OIML TC 9/SC 1 recently submitted the second Committee Draft (2 CD) of OIML R 76-1 "Non-automatic Weighing Instruments" to the participating members of TC 9/SC 1 for review, comment, and vote. The 2 CD was developed based on an analysis of the 1992 edition OIML R 76, answers from OIML TC 9/SC 1 members to a questionnaire distributed in May 2002, and comments on the December 2003 Working Draft (WD) for R 76. The 2 CD includes the changes to the December 2003 WD and the December 2004 1 CD based upon comments and recommendations of the U.S. National Work Group on R 76 (USNWG) and other countries.

The United States submitted twenty-seven recommendations and requests for clarifications to the Secretariat of TC 9/S C1 on the 1 CD and opposed the 1 CD being elevated to a Draft Recommendation. Eighteen of the U.S. recommendations and requests for clarification were accepted by the Secretariat, four recommendations resulted in alternate language proposed by the Secretariat, and five recommendations were not accepted by the Secretariat. The Secretariat provided the United States with a reason the remaining comments were not accepted.

The Secretariat has already registered the 2 CD of R 76-1 as a Draft Recommendation (DR) so as not to prolong the revision process at the technical committee level provided the 2 CD receives approval.

Summary: NIST WMD asked the USNWG for R 76 and other interested individuals, organizations, and associations to review the 2 CD and submit any comments, along with recommended language and technical justifications, to NIST WMD. During the 2006 NCWM Interim Meeting, Steven Cook, NIST WMD, provided the Committee with an update to the revision of R 76 and indicated that the United States will vote in favor of the 2 CD.

Although this current review of R 76 will likely be completed shortly, OIML has indicated a willingness to revisit the Recommendation and to consider including a large-capacity class similar to the current Handbook 44 Class III L and the Canadian Class III HD at some point in the future. WMD will be working with its Canadian counterparts to develop a North American Heavy-Duty Device Class.

6. Software Sector

Background: During the 2005 NCWM Annual Meeting, general comments from the floor were supportive of developing this issue further. The NTEP Committee discussed the pros and cons of software evaluation. General concerns related to difficulties identifying software and determining traceability to an NTEP Certificate of Conformance (CC) during field verification and providing NTEP laboratories with a meaningful and functional checklist for evaluating software security and functions. NCWM staff presented the costs involved with forming a sector and the costs to conduct a sector meeting. This information, along with a detailed action plan for the development of the sector charges, was presented and reviewed by the NCWM Board of Directors. Based on this information, a decision was made at the 2005 Annual Meeting to form a Software Sector. Funding was provided for this Sector in the 2006 Budget.

The first scheduled meeting of the Software Sector was held for April 5, 6, and 7, 2006, in Annapolis, Maryland.

Summary: During the 2006 NCWM Interim Meeting, the NTEP Committee Chair, Jim Truex, reported that the NTETC Software Sector was in the process of being formed. Interested parties have responded to a request to participate in this Sector and members will be appointed by the NTEP Committee Chair.

Excerpts from the "Request for Participation" in this Sector:

Without a doubt software is a major component of the weighing and measuring systems which are inspected today. NTEP evaluators need help. Weights and measures (W&M) field officials need help. Even manufacturers and designers are asking for help. The W&M community is asking for guidance on how to evaluate software, how to inspect software in the field, what to look for, what to inspect, what level of security is needed and what information should be marked and available on-site. We are looking for volunteers, the experts, and the software writers to

assist us in this endeavor. As you may know, the NCWM Board of Directors has decided to create an NTETC Software Sector.

At this time the recommended scope of the Software Sector is to:

- Develop a clear understanding of the use of software in today's weighing and measuring instruments.
- Develop NIST Handbook 44 specifications and requirements, as needed, for software incorporated into weighing and measuring devices. This may include tools for field verification, security requirements, identification, etc.
- Develop NCWM Publication 14 checklist criteria, as needed, for the evaluation of software incorporated into weighing and measuring devices, including marking, security, metrologically significant functions, etc.
- Assist in the development of training guidelines for W&M officials in verifying software as compliant to applicable requirements and traceable to an NTEP certificate. Educational material for manufacturers, designers, service technicians and end users may also be considered.

Funding for public sector participants:

It is the current NCWM policy to provide funding to a sector meeting to one public sector participant from each state NTEP Laboratory that is active in evaluating the device type(s) which will be discussed at the particular sector meeting. For the Software Sector, initially NCWM will provide funding to one (1) participant from New York (weighing), one (1) participant from Ohio (weighing), two (2) participants from California (one weighing, one measuring), and two (2) participants from Maryland (one weighing and one measuring).

SOFTWARE SECTOR
Meeting Summary
Annapolis, Maryland
April 5, 6, 7, 2006

Action items:

1. Software identification D-SW 5.1.1 model/version, etc., help screen?
    a. Built-for-Purpose
    b. Not-Built-for-Purpose
    c. Version number or greater
2. Software protection/security D-SW 5.1.3
    a. Identification of unapproved/unauthorized software
3. Storage of data, D-SW5.2.3 and subsections, automatic storing and transmission
4. Software maintenance and reconfiguration D-SW5.2.6
5. D-SW Section 7. verification in the field needs work
6. Manufacturer documentation to be submitted, change to the NTEP application D-SW 6.1.1
7. Definitions Software-Based Device, etc.

Note: Underlined "D-SW" sections above refer to the document OIML D-SW, "General Requirements for Software Controlled Measuring Instruments."

The group agreed that Jim Truex should continue as Software Sector Chair.
Mr. Truex asked Steve Patoray to continue as technical advisor to the Software Sector. It was requested that NIST consider the role of technical advisor in the future, as they currently do with other Sectors.

The next meeting of the Software Sector is scheduled for Wednesday and Thursday, October 18 and 19, 2006, in Annapolis, Maryland, immediately prior to the Measuring Sector meeting.

For questions on the current status of Sector work or to propose items for a future meeting, please contact the Sector technical advisor.

7. Conformity Assessment Program (CAP)

At the fall 2005 NTEP Committee Meeting, the Committee discussed the current status of this project. The following items were noted:

Certificate Review: The question is how this would be accomplished given the limited resources of NCWM. It was suggested that this item may need to be put on a "back burner" until resources can be clearly identified to proceed with the project in an efficient, thorough and accurate manner.

Initial Verification: This part of the project is moving forward. The work group chair, Lou Straub, has sent out requests to several states to act in the pilot program for this area. Several of the states have responded positively. The work group is currently waiting for data. There are still questions on what will be done with this data and how it will be tabulated.

Verified Conformity Assessment Program (VCAP): It is the opinion of the NTEP Committee that additional information may be needed from the work group in order to move this area of the program forward. A request will be made to the work group chair for a report on the current status of this committee.

Summary: During the 2006 NCWM Interim Meeting:

The Chair of the Certificate Review work group, Don Onwiler, reported that the work in this area will not commence until there is adequate information available from the pilot being conducted by the Initial Verification Group. Once this information is available, the work to define the certificate requirements for price computing scales can begin.

The Chair of the Initial Verification work group, Lou Straub, reported that requests for assistance have gone out and have been accepted by several state and local jurisdictions. Currently, he has received some feedback on the draft checklist. At this time, no actual completed forms have been returned. Several states made a commitment to put a priority on getting completed checklists submitted.

The NTEP Committee Chair, Jim Truex, reported that he has had contact from the chair of the Verified Conformity Assessment Program (VCAP), Mark Knowles, stating that the work group has completed its initial work and will provide the NTEP Committee with a final report prior to the April timeframe. Based on this report, the NTEP Committee will notify members of its content, request comment, and determine the next steps that need to be taken.

The NCWM Board of Directors has received a final report from the co-chairs of the Verified Conformity Assessment work group (VCAP). This will be reviewed by the NCWM Board and further action will be identified.

The NCWM Board of Directors has received information from the chair of the Initial Verification (IV) work group that data has begun to come in from various states. The NTEP Committee authorized the IV work group to develop initial verification checklist for vehicle scales and retail motor-fuel dispensers. The NCWM Board will discuss this information further at its next scheduled Board Meeting.

8. NTEP Certification of Residential-Type Water Meters

New Item:

Summary: A request has come in from one state for NTEP to conduct evaluations and certify residential-type water meters. After discussions on this topic, the NTEP Committee made the decision to look into this item and determine the feasibility for NTEP to certify such devices. It was noted that currently there is a section in NIST Handbook 44 for these types of devices. It was also noted that California already conducts evaluation and certification under a state-type evaluation program on these types of devices based on the current specifications,

tolerances and other technical requirements in NIST Handbook 44. It was the belief of the Committee that work to complete a checklist and set up testing on such devices would not be a major effort. It was noted that the OIML R 49 is currently undergoing review, and also that there are significant differences between the requirements in NIST Handbook 44 and the OIML recommendation on this type of device. The NTEP director will report to the NTEP Committee on findings into setting up this certification.

The NTEP Committee also discussed the potential for NTEP certification of vapor meters.

Both issues of NTEP certification of water meters and vapor meters will be discussed at the next Measuring Sector meeting in October 2006. The Sector will focus on reviewing existing checklists from various states and work toward a recommendation for the NTEP Committee to consider.

James Truex, Ohio, NTEP Committee Chair
Don Onwiler, Nebraska, NCWM Chair
Mike Cleary, California, NCWM Chair-Elect
Stephen Pahl, Texas
Charles Carroll, Massachusetts

NTEP Technical Advisor: S. Patoray, NTEP Director
NTEP Technical Advisor: S. Cook, NIST WMD

National Type Evaluation Program Committee

Appendix A

National Type Evaluation Technical Committee (NTETC)
Grain Analyzer Sector

August 24 - 25, 2005 – Kansas City, Missouri
Meeting Summary

Agenda Items

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1. Report on GIPSA/NIST Interagency Agreement – Fee Increase

The Grain Inspection Packers and Stockyards Administration (GIPSA) and the National Institute of Standards and Technology (NIST) signed an updated Interagency Agreement in March 2005 that provides funding for the Grain Moisture Meter On-going Calibration Program (OCP) for fiscal years 2005 through 2009. Under the terms of the updated agreement, NIST and GIPSA each will contribute one-third the cost of the program subject to an annual maximum of $26,500 each. The balance of costs is borne by manufacturers and depends on the number of meter models in the NTEP "pool" according to the fee schedule shown below. Implementation of this fee schedule became effective at the start of FY2005 (October 1, 2004). The fee schedule shown below was developed about two years ago using a modest estimate of likely increases in GIPSA's costs. Dr. Richard Pierce, GIPSA, reported that GIPSA's hourly rate for NTEP evaluations has risen to $83.20 and the fee for air oven moisture determinations has increased to $13.00 each. In spite of these increases, the OCP Fee Schedule is expected to remain as shown below through FY 2009.

NTEP On-going Calibration Program Fee Schedule for Fiscal Years 2005 - 2009							
(1) Total Meters (including official meter)	(2) Meters in NTEP Pool	(3) Cost per NTEP Pool Meter	(4) Total Program Cost	Funding Contribution from Participants			
				(5) NIST	(6) GIPSA	(7) Manufacturers (total funding from mfg's)	(8) Cost per Meter Type
2	1	$19,875	$19,875	$6,625	$6,625	$6,625	$3,315
3	2	19,875	39,750	13,250	13,250	13,250	4,415
4	3	19,875	59,625	19,875	19,875	19,875	4,970
5	4	19,875	79,500	26,500	26,500	26,500	5,300
6	5	19,875	99,375	26,500	26,500	46,375	7,730
7	6	19,875	119,250	26,500	26,500	66,250	9,465
8	7	19,875	139,125	26,500	26,500	86,125	10,765
9	8	19,875	159,000	26,500	26,500	106,000	11,775

2. Report on the 2005 NCWM Interim and Annual Meetings

The Interim Meeting of the 90th National Conference on Weights and Measures (NCWM) was held January 23 - 26, 2005, in Santa Monica, California. At that meeting, the NTEP Board of Directors accepted the Sector's recommendation to merge the Grain Moisture Meter Sector and the Near-Infrared Grain Analyzer Sector into a new Sector to be called the Grain Analyzer Sector. The NTEP Committee accepted the Sector's recommended amendments and changes to the 2004 Edition of the Grain Moisture Meter chapter of Publication 14. These changes appear in the 2005 Edition of NCWM Publication 14. For additional background refer to *Committee Reports for the 90th Annual Meeting,* NCWM Publication 16, April 2005.

Amendments and Changes to the 2004 Edition of the Grain Moisture Meter Chapter of Publication 14		
Section Number	**Amendment/Change**	**Page**
Section IV. Tolerances for Calibration Performance	Add Item c. to establish an overall calibration bias requirement based on up to three years of available data. Change wording in paragraph preceding Item a. and in paragraph following Item c. to reflect addition of Item c.	GMM-5 through GMM-6
Section VII.B. Accuracy, Precision, and Reproducibility	Change the Minimum Test Weight per Bushel Ranges in the table in §VII.B. to facilitate selection of test-set samples.	GMM-11
Section VII.B. Accuracy, Precision, and Reproducibility	Change tolerances for repeatability (precision) for corn and oats to more realistic value.	GMM-13

The 90th Annual Meeting of the NCWM was held July 10 - 14, 2005, in Orlando, Florida. No Grain Moisture Meter (GMM) or Near-Infrared (NIR) Grain Analyzer items appeared in the Specifications and Tolerances (S&T) Committee Interim Report for consideration by the NCWM at the 2005 Annual Meeting.

Steve Patoray, NTEP Director, expressed concern about declining attendance at the NCWM Interim and Annual Meetings. He encouraged Sector members to attend future meetings. At least one state weights and measures representative related that a lack of state funds (and withdrawal of NCWM travel support) had severely limited out-of-state travel to meetings.

Steve reported that an electronic version of NCWM Publication 14 is now available in Adobe Acrobat PDF format on compact disk (CD). Single CDs are priced at $135 plus postage and handling. Because of copyright issues, the PDF file is locked so it is not possible to print a hard copy of the document. It is possible, however, to add comments and highlight text. All four sections of Publication 14 are included on the CD. Order forms can be found on the updated NCWM website, http://www.ncwm.net/. Search capabilities for NTEP certificates have been greatly improved on the updated site. Steve cautioned that users must delete existing "bookmarks" to the old certificate

database search page. The new certificate database cannot be reached using the old "bookmarks." The new database can be accessed easily from the new home page.

Steve briefed the Sector on the Verification Conformity Assessment Program (VCAP) under development for weighing devices or components of weighing devices. Initial verification will not repeat NTEP testing, but will involve field checking of model numbers and markings and will include some general testing to verify that the devices meet type. Additionally, there will be a third-party assessment of the manufacturer's quality system. The manufacturer must have a sampling plan and documented evidence to show that it is being used. The manufacturer must also comply with a sub-set of ISO/IEC 17025, ***General requirements for the competence of testing and calibration laboratories***, demonstrating that all the factors that may contribute to errors in the calibration process have been taken into account.

3. Report on NTEP Type Evaluations and OCP (Phase II) Testing

Cathy Brenner, GIPSA, the NTEP Participating Laboratory for Grain Analyzers, reported on NTEP Type Evaluation activity. In addition to regular grain moisture meter calibration updates, evaluations are currently underway for three additional devices: one for test weight per bushel (an add-on to a currently approved grain moisture meter); one new grain moisture meter with test weight capability; and one new NIR grain analyzer for miscellaneous constituents including moisture. Cathy also reported that the following devices would be enrolled in the OCP (Phase II) for the 2005 harvest:

[Note: Models listed on a single line are considered to be of the same "type."]

DICKEY-john Corporation	GAC2000, GAC2100, GAC2100a, GAC2100b
Foss North America	Infratec 1241
Foss North America	Infratec 1227, Infratec 1229
Seedburo Equipment Company	1200A
The Steinlite Corporation	SL95

4. Proposed Change to NCWM Publication 14 – Bias Tolerances for Test Weight per Bushel

Background: The Grain Moisture Meter (GMM) Chapter of Publication 14 calls for testing the automatic test weight per bushel (TW) measuring feature of GMMs for accuracy, repeatability (precision), and reproducibility using 12 selected samples of each grain type (for which the meter has a pending or higher moisture calibration). The two tests for accuracy are bias (meter versus the standard reference method) and the Standard Deviation of the Differences (SDD) between the meter and the standard reference method. Publication 14 states that, "The manufacturer may adjust the calibration bias to compensate for differences from the type evaluation laboratory in reference methods or sample sets."

Recent NTEP tests revealed that the results of the bias test, which uses only 12 selected samples, are sample set dependent. The following table illustrates this dependence. No changes were made to the meters between the tests using Sample Set 1 and Sample Set 2. The table also shows how those same meters compare against the most recent three crop years of Phase II test weight (TW) data.

		Test Weight per Bushel Bias				
Grain Type	**GMM Model**	**Based on Phase II TW Data (3 crop-years)**	**Sample Set 1**		**Sample Set 2**	
			Meter "A"	**Meter "B"**	**Meter "A"**	**Meter "B"**
Corn	1	–0.20	–0.02	+0.01	–0.36	–0.24
	2	+0.09	+0.79	+0.13	+0.82	+0.32
Oats	1	–0.27	–0.06	+0.04	–0.29	–0.24
	2	–0.14	–0.04	+0.03	–0.14	–0.16
Six-Row Barley	1	–0.21	–0.01	–0.05	–0.01	–0.02
Sunflower	1	–0.10	–0.02	–0.09	+0.10	+0.13

Because of the above-observed differences, the NTEP Lab did not list specific bias terms on the Certificate of Conformance (CC) for instruments recently evaluated for TW. Instead, the CC simply indicates that the meter is approved for Test Weight per Bushel measurements.

Discussion: The NTEP Lab proposed eliminating the bias tolerance requirement for test weight per bushel from the accuracy tests of the GMM Chapter of Publication 14. The test would still be conducted, and TW bias results would be provided to the manufacturer as is currently done with NIR grain analyzer protein and oil bias results.

Dr. Charles Hurburgh, Iowa State University, pointed out that based on data taken on only 12 samples, the bias differences between Sample Set "1" and Sample Set "2" did not appear to be statistically significant and asked if this might be a reproducibility issue. For these tests, Publication 14 specifies that samples will be dropped three times through each of two meters. He asked if more than three drops might be needed. He noted also that for corn there was an unusually large difference in biases between Meters "A" and "B" of Model 2 for both sets of samples. He suggested that the Sector consider adding a requirement to Publication 14 to specify that the difference in bias between the two instruments submitted for evaluation must not exceed the individual instrument tolerances for bias.

Dr. Richard Pierce, GIPSA, explained that there is a difference between the sample sets used for Phase I moisture evaluations and Phase I Test Weight per Bushel (TW) evaluations. Sample sets for moisture evaluations are carefully pre-screened. As a result, they have produced very similar results from year to year, although the individual grain samples that comprise a set vary from year to year. Conversely, the process for selecting samples for TW evaluations is somewhat random (except for moisture distribution criteria and the requirement that samples represent a distribution of TW that minimizes the correlation between TW and moisture). There is no reason to expect two different sets of TW samples to agree, and there is no way to determine if one set is better than another. Consequently, bias data obtained using a TW sample set is not suitable for determining what adjustment should be applied to minimize bias error on a large population of samples.

One Sector member asked if there might be a better way to pre-select TW samples to obtain a more reproducible sample set. Dr. Pierce replied that pre-screening is very difficult. Adding more criteria to the selection of TW samples will make sample selection even more difficult. The fact that in many years very low TW samples are not available further contributes to this difficulty.

Sean Bauer, Steinlite Corporation, mentioning that TW can change with time, asked if there was a significant time interval between determination of TW by the standard kettle method and the measurement of TW on the meters. Cathy Brenner, GIPSA, stated that these tests were conducted on either the same day or the next day. She added that operator uniformity had been verified and that data obtained by check test operators had been compared with data taken on the same samples for Phase II tests. It was determined that the procedures used did not contribute to the observed differences between the two TW test sets.

Jack Barber, Co-Technical Advisor to the Sector, expressed concern about not listing grain-dependent bias adjustment coefficients on the CC. He pointed out that NIST Handbook 44, Section 5.56.(a) Grain Moisture Meters Code, stipulates:

> **S.2.4.3. Calibration Transfer** - *The instrument hardware/software design and calibration procedures shall permit calibration development and the transfer of calibrations between instruments of like models without requiring user slope or bias adjustments.*

This requirement applies to both moisture and TW calibrations. [*Editor's note:* For further background on the Sector's original intent regarding calibration transfer between grain moisture meters of like type, see Agenda Item 9 in the Grain Moisture Meter Sector March 1997 Meeting Summary.] In devices where grain-dependent TW calibration coefficients (including bias adjustment coefficients) are imbedded in the CC listing of grain moisture calibration coefficients, there is no problem. Any change in coefficients affecting TW will require a change in the moisture calibration and an amendment to the CC. The concern is with devices that do not treat a grain-dependent TW bias adjustment coefficient as part of the moisture calibration. In that case, unless grain-dependent bias adjustment coefficients are listed on the CC, there is no way for field inspectors to know if the most recent adjustment coefficients are being used for test weight. The Sector agreed that if the bias adjustment term is not part of the moisture calibration coefficients then it must be listed on the certificate.

The Sector was in general agreement that TW data from the OCP (Phase II) was the best measure of how closely a meter is biased to the standard quart kettle method. In response to a question of whether Phase II TW data for corn for the entire moisture range should be used or only data for a restricted (and lower) moisture range, Dr. Pierce replied that TW data above 20 % moisture would not be used.

The proposed use of Phase II TW data raised several questions:

1. What grain-dependent bias correction coefficient should be specified before the meter has been in the OCP for at least one year?
2. Should a TW calibration that has not been verified in the OCP be classified as "pending?"
3. Should the most recent three years of available data be used to determine if a bias adjustment is necessary? If so, what tolerance should be applied?

In the ensuing discussion, the Sector agreed that the manufacturer should specify the grain-dependent bias correction coefficients to be used initially, provided the devices could pass Phase I tests using those coefficients. Although no vote was taken, there was not enthusiastic support for classifying the initial TW calibration as "pending," and no one suggested what tolerance should be applied after the device had been in the OCP for a year or more.

Conclusion: The Co-Technical Advisor was requested to develop suggested wording for changes to Publication 14 to reflect the following:

1. The Bias test for TW Accuracy will be retained.
2. Data from the Phase II On-going Calibration Review Program may be used at the manufacturer's discretion to support a grain-specific TW bias-adjustment change in a TW calibration.
3. A new Phase I evaluation is NOT required for a grain-specific TW bias-adjustment change in a TW calibration supported by Phase II data.
4. Any change in a grain-specific TW calibration (including changes in grain-specific bias adjustments) must be reflected on the CC in a manner obvious to field inspectors.
5. The Bias results for TW accuracy for each of the two instruments of like-type submitted for evaluation must agree with each other by the same tolerance that they must agree with the reference method.

If possible, the proposed changes will be submitted to the Sector by letter ballot for approval in time to forward the item to the NTEP Committee for consideration at the NCWM Interim Meeting in January 2006.

5. Comparative NTEP On-going Calibration Program (OCP) Performance Data

Source: Seedburo Equipment Company

Background: At the Sector's August 2004 meeting, Dr. Richard Pierce, GIPSA (the NTEP Laboratory), presented graphical data showing the comparative performance of all NTEP meter types vs. the air oven. These data were based on the last three crop years (2001 - 2003) using calibrations updated for use during the 2004 harvest season. Because of the proprietary nature of OCP data, individual meters (including the Official Meter) were not identified by model or by manufacturer. There were lengthy discussions on these results, speculation about which instruments were which, and questions of whether calibration verification analysis was actually being conducted by some manufacturers. Some comments suggested that a meter manufacturer might not be aware of their relative position based on these comparisons. Examination of the comparative performance data led the Sector to recommend changes to the GMM Chapter of Publication 14 to set a limit on average calibration bias (with respect to air oven) to improve alignment between meter types.

Recommendation: To assist manufacturers in improving NTEP grain calibrations and to achieve better uniformity between meter types, the sector should annually review comparative OCP performance data identifying the USDA-GIPSA Official Meter and containing average bias data for each meter type on each grain.

Discussion: Some meter manufacturers have since expressed concern that the Official Meter was not identified in the presentation of comparative performance data. Even though the air oven is the standard reference against which NTEP meter performance is measured in the OCP, the Official Meter is the *de facto* standard for the grain trade. Other manufacturers want to know how their meters compare with the Official Meter.

Regular review of comparative OCP performance data by the Sector has definite advantages:

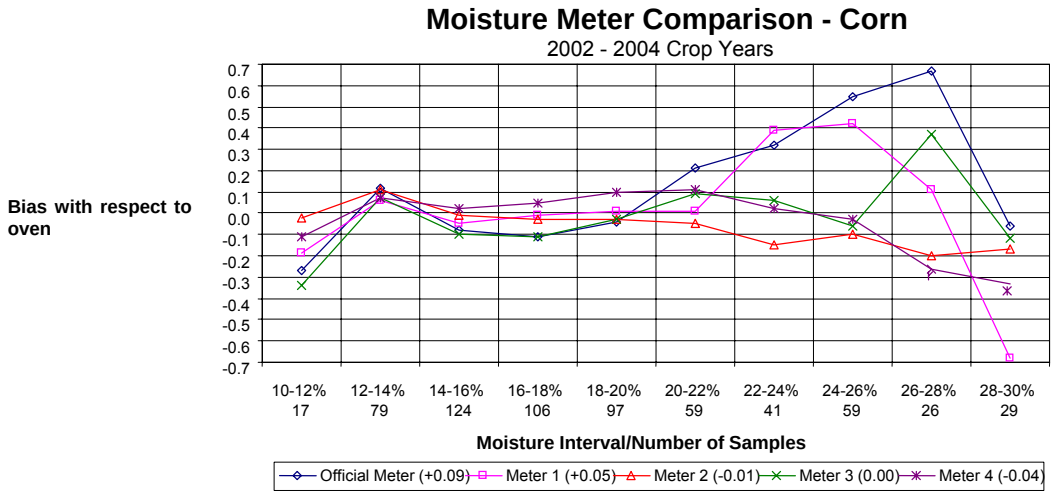
- Calibration performance problems not addressed by existing requirements are exposed.
- Manufacturers can see how their instruments compare with others.

To be of greatest value to manufacturers, the comparative OCP performance data must identify the Official Meter and list the average bias for each meter type on each grain. Accuracy of the Official Meter (average differences between the GAC 2100 and Air Oven as percent moisture) based on the U.S. nationwide sample set, 3 years' data, and most recent review, is already being published annually by USDA GIPSA/FGIS in Directive 9180.61. This is the OCP performance data for the Official Meter, so there should be no proprietary/confidentiality issues regarding identifying the Official Meter in the presentation of comparative OCP performance data.

Conclusion: The Sector agreed that the proposed comparative performance data should be available for annual review by the Sector. In the event that the Sector does not hold a formal meeting in any year, the data for that period can be distributed by e-mail for review. Note: The OCP data presented in Agenda Item 6 for 2002 - 2004 does specifically identify the Official Meter.

6. Review of On-going Calibration Program (Phase II) Performance Data

Background: This item was included on the Sector's agenda to provide information to the sector on the OCP meter performance data with calibrations updated for the 2005 grain season. Cathy Brenner of GIPSA, the NTEP Participating Laboratory for Grain Analyzers, presented data showing the performance of NTEP meters compared to the air oven. These data are based on the last three crop years (2002 - 2004) using calibrations updated for use during the 2005 harvest season. The Official Meter is the only meter specifically identified. The numerical identifiers were assigned randomly to the remaining meters except for sunflowers where, because only three devices are approved, the remaining meters are identified by the letters A and B. Meter 1 is the same instrument for all grains, etc. The moisture range covered by these graphs is the same moisture range listed on USDA GIPSA/FGIS in Directive 9180.61. As an example of the data presented, the graph for corn is shown below. The number in parentheses following the meter identification in the box beneath the graph indicates the average bias for that meter across the full moisture range represented by the graph. A PDF file with graphs of all NTEP grains is available from Co-Technical Advisor, Jack Barber. Send requests to jbarber@motion.net.



7. Effective Dates for NTEP and GIPSA Calibration Changes

Background: Grain Industry representatives have repeatedly stressed the importance of keeping NTEP calibration changes synchronized with GIPSA calibration changes. In the past, calibration changes for the Official Moisture Meter were made on a staggered schedule typically between May 1 and August 1, with dates chosen to coincide with the time at which stocks would be at their lowest level to minimize economic impact. Several years ago GIPSA reduced the number of dates for changing calibrations to two: May 1 for the NTEP grains wheat, barley, sorghum, rice, and oats; and August 1 for NTEP grains corn, soybeans, and sunflowers. These dates represent a compromise between making calibrations available prior to harvest and ensuring that grain stocks will be at their lowest levels. The present timeline for NTEP Phase II activities lists July 1 as the latest date for re-issuing the annual CC. However, because a July 1 date would miss the heat harvest in many states, the CC for the Official Moisture Meter is now re-issued no later than May 1 for all NTEP grain calibrations. The CC notes the effective dates for the calibrations to indicate when they will be put into use in the official system.

When this issue was discussed at the Sector's March 1998 meeting, one weights and measures representative wondered how to handle meter inspections performed in July, asking which calibration should be used, the one effective August 1 or the existing one. Opinions were divided on the best way to handle this situation. In one state, old calibrations may be used until the effective date of the new calibration, after which the device is re-inspected to verify that the new calibration has been installed. Others felt that this method of enforcement was not realistic, because it could result in requiring two or more trips per year to the majority of meters in their jurisdictions. They favored having the user install the new calibration at time of inspection. A manufacturing representative pointed out that the only purpose of specifying "effective dates" on a CC was to match the dates on which the new calibrations would be used in the official system. He suggested that W&M inspectors tell the user that the new calibration must be installed on the effective date if they want their meter to be in closer agreement with the Official Meter. It was recognized that the use of effective dates wasn't a new concept. Prior to the NTEP program, manufacturers had revised calibrations at various dates, sometimes without much warning, and often after a significant number of meters had already been inspected for the current season. States with inspection programs had already figured out how to deal with this situation. At that time, the Sector decided that the details of enforcement should be left to each state to decide based on their individual needs.

The issue of CCs showing only the current calibration details for calibrations with delayed (August 1) effective dates (when used on Official Meters) has come up again, this time in the case of cross-utilized meters. Under GIPSA's cross-utilization program, elevator or official agency-owned instruments can be "cross-utilized" between official inspection and commercial applications. Problems have arisen when such meters fail state inspections but fully comply with GIPSA directives and requirements. In April, an Illinois weights and measures inspector checked, and

rejected, an official agency meter. The inspector correctly used the most recent CC that had been re-issued in February to reflect the addition of test weight per bushel testing features. Although the moisture measurement calibration constants remained the same as on the previous version of the CC, constants relating to Test Weight had been revised. The official agency meter contained the constants from the previous certificate, matching the constants of the then current GIPSA Program Directive. Although this situation was unique arising from the addition of NTEP approval for test weight and a February CC revision, there is still a problem when there is a difference between the issue date of a CC and the implementation dates for calibration changes shown on the CC. For example, this year the new CC (issued prior to May 1, 2005) for the Official Meter listed constants for soybeans that were not scheduled for implementation until August. The soybean calibration constants shown on the 2005 CC did not agree with those shown on GIPSA Program Directive 9180.61 (dated May 1, 2005) until GIPSA reissued the Program Directive with the new soybean constants on August 1, 2005.

Recommendation: The CC for the Official Meter is issued on May 1, but GIPSA introduces changes (if required) in the official system on two different dates: May 1 (for all grains except corn, soybeans, and sorghum) and August 1 for corn, soybeans, and sorghum. Unnecessary rejections of cross-utilized meters could be avoided if state inspectors retained a copy of the previous CC that lists the calibration constants for corn, soybean, and sorghum approved for use prior to August 1. To eliminate the burden of having to retain copies of old certificates and the possibility of using an old certificate by mistake, the NTEP Laboratory proposed an addition to the certificate showing the constants from the previous, superseded certificate for any grains with an implementation date later than May 1 (corn, soybean, and sorghum). Rich Pierce, GIPSA, commented that the FGIS Technical Services Division had proposed that all changes to the official system affecting NTEP grains be complete by May 1, so that calibration changes for any NTEP grain on the Official Meter are issued at the same time the CC is issued for the Official Meter.

Conclusion: The Sector rejected the proposal. Weights and Measures representatives were of the opinion that this was not a big issue in practice, and that it may be a training issue.

8. "All-Class" Moisture Calibrations

Background: The GMM type evaluation program is currently structured to deal with individual class calibrations for moisture. The NIR Grain Analyzer program allows for either individual class calibrations or "all-class" calibrations for constituents other than moisture. One currently certified GMM uses an "all-class" barley calibration that is listed separately on the certificate under two-row barley and six-row barley with different approved and pending moisture ranges for each of those classes. Two other instruments currently certified for grain moisture list the barleys, rough rices, and wheats separately on the certificate and have the meters set up with individual class calibrations. These two meters have a single equation and bias term for all classes of barley; another equation and bias term for all classes of rough rice; and a third equation for all classes of wheat with separate bias terms for all soft classes, all hard classes, and durum.

A grain moisture meter currently being evaluated has a single wheat calibration (excluding durum), which may be called an “all type” calibration because the calibration covers something other than all the grains in a class, single rice, and single barley calibration with a common equation and separate bias terms for each grouping. Another instrument being evaluated uses a single calibration and bias term for wheat (excluding durum).

Recommendation: Cathy Brenner, GIPSA (the NTEP Participating Laboratory for Grain Analyzers), asked the Sector to consider the following questions regarding the evaluation of grain analyzers using "all-class" or combined-grain moisture equations:

- How should such devices be evaluated?
- What should be placed on the certificate for approved and pending moisture ranges?

For type evaluation purposes, she suggested treating "all-class" moisture calibrations in a manner similar to the way "all-class" calibrations for other constituents are handled on NIR Grain Analyzers. "All-class" moisture calibrations would have to meet the accuracy, precision, and reproducibility requirements for the test sets of each included class in addition to meeting the "all-class" accuracy requirement when the data from all the included classes is pooled.

For example in the case of an "all-class" wheat moisture calibration covering 5 classes of wheat, the basic 6 % moisture range for evaluating a hard white wheat calibration is 8 % to 14 % moisture content while the basic 6 % range for evaluating calibrations for the other classes of Wheat is 10 % to 16 %. Thus, an "all-class" Wheat calibration would be tested over an 8 % moisture range of 8 % to 16 % rather than the standard 6 % range.

The "approved" moisture range for an "all-class" moisture calibration would cover the range from the absolute lower to the absolute upper 2 % moisture interval for which the meter meets individual class tolerances. If an individual class does not have samples available in a given 2 % moisture interval to meet the approved tolerances, the meter must meet the pending tolerances in order for that moisture interval to be listed as "approved" on the certificate.

The "pending" moisture range for an "all-class" moisture calibration would cover the ranges from the absolute lower to the absolute upper 2 % moisture interval for which the meter meets the individual class tolerances. If an individual class does not meet either the approved or pending tolerances in a given 2 % moisture interval, then the next lower or upper moisture interval for which the meter meets either the "approved" or "pending" tolerances for each individual class is listed as the "pending" moisture range on the certificate.

Rich Pierce, GIPSA, reminded the Sector that Phase I testing was originally intended to evaluate basic meter capability – to check permanence, accuracy, repeatability and reproducibility. Soybeans, hard red winter wheat (HRWW), and Corn were chosen as representative test media to demonstrate basic meter capability. These three grains could still be used to evaluate devices having an "all-class" or "all-wheat" calibration. NCWM Publication 14 stipulates that grains other than corn, soybeans, and HRWW will be checked for calibration bias before they can be listed on the CC. This implies that grains in an "all-class" or "all-wheat" calibration would be individually checked for bias against air oven prior to being listed on an original CC.

Discussion: The issue of "pending" and "approved" ranges for "all-class" or "all-type" calibrations led to a lengthy discussion. The Sector struggled with how to handle cases where Phase II data resulted in different approved or pending ranges on the individual grain types included in an "all-class" or "all-type" calibration. What range should appear on the CC? Again, the general opinion was that ranges should not be reduced due to lack of data. If one class of Wheat had insufficient samples in a 2 % interval to support a "pending" rating for that interval while another Wheat class had samples supporting a "pending" rating for the same 2 % interval, it seemed logical to allow the interval to have a "pending" rating in the "all-class" or "all-type" calibration. One member reasoned that the 2 % interval with insufficient Phase II samples to support a "pending" rating was also unlikely to see many market samples in that moisture interval.

In a related issue, Rich Pierce mentioned that the NTEP Laboratory is having problems increasing and decreasing ranges of the meter depending on the data available in the most recent three-year period. Most Sector members agreed that it didn't seem reasonable to reduce a range solely because data previously used to justify the range classification had to be dropped from the most recent 3-year period.

Conclusion: A final decision on this issue was postponed until specific wording for Publication 14 could be developed to address the handling of cases where Phase II data resulted in different approved or pending ranges on the individual grain types included in an "all-class" or "all-type" calibration. The Sector agreed that existing Phase I test methodology was adequate for "all-class" and "all-type" calibrations. Phase I testing will be performed only with corn, soybeans, and HRWW. If an "all-wheat" (except durum) calibration is submitted, HRWW will be used for the Phase I tests. Until one or more years of Phase II data are available, grains other than corn, soybeans, and HRWW will be checked for calibration bias before they are listed on the CC.

Diane Lee, NIST, Co-Technical Advisor to the Sector, agreed to send manufacturers a request for additional suggestions/comments on this issue. Comments are due by the end of October. Co-Technical Advisor, Jack Barber, will consider these comments in developing wording for changes to NCWM Publication 14. A letter ballot on the final wording is to be circulated in time to be considered by the NTEP Committee at the NCWM Interim Meeting in January 2006.

9. Editorial Correction to GMM Chapter of Publication 14 – Table in Appendix D

Background: At its August 2003 meeting the GMM Sector recommended changing the hard white wheat moisture range from "10 % to 16 %" to "8 % to 14 %" in the table **Moisture Ranges and Tolerances for Sample Temperature Sensitivity** in Appendix D of the 2003 Edition of the GMM Chapter of Publication 14. The Sector also noted that missing quotation marks needed to be added in the table's heading and that medium grain rough rice with a moisture range of 10 % to 16 % and tolerance limit of 0.45 (as approved at the Sector's September 1997 meeting) needed to be added to the table; this entry to the table was inadvertently omitted from the 2001 and 2002 editions of Publication 14.

The 2004 Edition of the GMM Chapter of Publication 14 incorporated the following changes to the Table in Appendix D:

- The missing quotation marks were added to the table heading in Appendix D
- The hard white wheat moisture range in the table was changed to "8 % to 14 %".
- Medium grain rough rice with a moisture range of 10 % to 16 % and tolerance limit of 0.45 was added to the table.

However, the row for long grain rough rice was mistakenly deleted from the table. This error was addressed at the Sector's August 2004 meeting and the Sector was advised that because this was an editorial error, it could be corrected without making the issue a formal Agenda Item. Unfortunately, the error was not corrected in the 2005 Edition of the GMM Chapter of Publication 14.

Recommendation: Correct the **Moisture Ranges and Tolerances for Sample Temperature Sensitivity** Table on page 43 of Appendix D of the 2005 Edition of the GMM Chapter of Publication 14 by inserting a row for grain type long grain rough rice (with Moisture Range 10 % to 16 % and Tolerance Limit 0.45) between the rows for oats and medium grain rough rice.

Conclusion: The Sector agreed unanimously to the proposed correction as shown in the following table.

Moisture Ranges and Tolerance for Sample Temperature Sensitivity (for the "Other 12" NTEP Grains)		
Grain Type	**Moisture Range for Test**	**Tolerance Limit (Bias at Temperature Extremes)**
Durum Wheat	10 % to 16 %	0.35
Soft White Wheat	10 % to 16 %	0.35
Hard Red Spring Wheat	10 % to 16 %	0.35
Soft Red Winter Wheat	10 % to 16 %	0.35
Hard White Wheat	8 % to 14 %	0.35
Sunflower seed (Oil)	6 % to 12 %	0.45
Grain Sorghum	10 % to 16 %	0.45
Two-rowed Barley	10 % to 16 %	0.35
Six-rowed Barley	10 % to 16 %	0.45
Oats	10 % to 16 %	0.45
Long Grain Rough Rice	10 % to 16 %	0.45
Medium Grain Rough Rice	10 % to 16 %	0.45

10. Evaluating GMM Moisture Accuracy as a Continuous Function across the Entire Moisture Range

Source: Charles R. Hurburgh, Jr., Iowa State University

Background/Discussion: Section III of the GMM Chapter of NCWM Publication 14 calls for testing device accuracy over a 6 % moisture range using 10 samples selected from each 2 % moisture interval. The two tests for accuracy are bias (meter versus oven) and the Standard Deviation of the Differences (SDD) between the meter and the air oven for each of the 2 % moisture intervals. The bias of all samples in each 2 % moisture interval of the full moisture range is also the basis for evaluating GMM calibration performance annually using data collected as part of the on-going national calibration program.

The evaluation of accuracy (for moisture) in two percentage point intervals, with an independent evaluation in each interval, assumes that the performance of a device is not continuous and can be adjusted in each of the increments independently of the others. This is not a true assumption, and so the individual increment evaluations, particularly in cases where fewer than 20 samples (not enough to encompass the full 95 % confidence interval (CI) that the tolerances are based upon) become partially dependent on the properties of the samples in the increments. Naturally all samples cannot be tested in all increments, so there is automatically a nested design. Instrument performance is a continuous function. As an alternative to the present evaluation method, data interpretation (not the design of the lab work) could require that the overall bias (across all samples) not be statistically significant ($p = 0.05$) and that there be no significant slope (Δ error / Δ oven moisture) across the range of data. The variability test (SDD) could remain the same as it is now. The NIR program is essentially this way now, because there are no ranges for the constituents. A second alternative for consideration is to use a moving average (across ranges) to test bias and standard deviation.

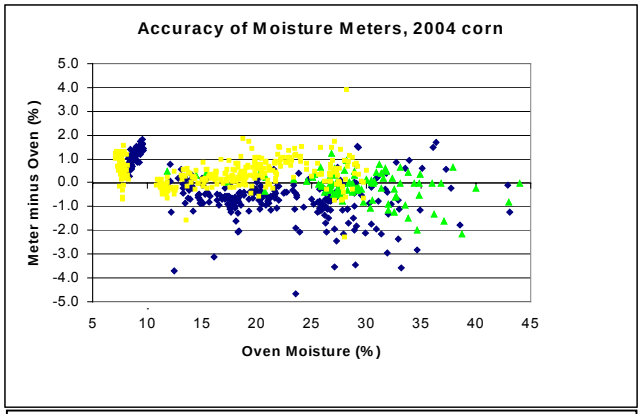


Figure 10.1 – Typical Error Patterns, 2004 Corn

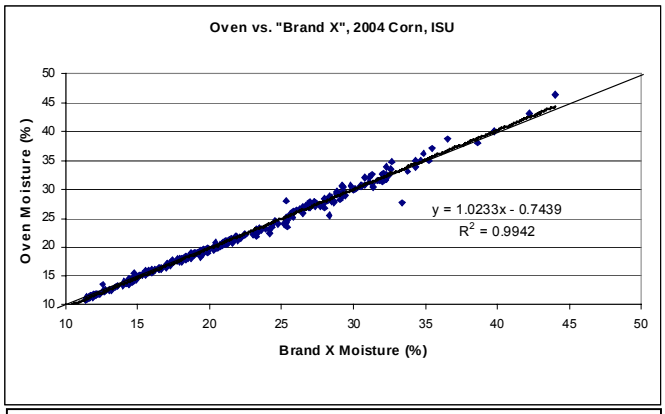


Figure 10.2 – Oven vs. Meter, Brand X

Figure 10.1 shows typical moisture error patterns (meter minus air oven) for three device types based on 2004 corn crop data. Figure 10.2 illustrates the continuous nature of meter performance when measured over the full range of operation.

Dr. Hurburgh commented that the study of error functions was mostly applicable to Phase II evaluations, but because of the small number of samples involved in Phase I testing, the study might provide suggested improvements for interpreting Phase I data.

Recommendation: The Sector was asked to review this issue and consider making it a work project for the coming year with formation of an *ad hoc* study group composed of interested Sector members and non-member statistician(s).

Conclusion: Dr. Hurburgh volunteered to chair an *ad hoc* study group to review the issues outlined in Agenda Items 10 and 11. He will send a questionnaire to Sector members and interested parties to determine who is interested in joining the group.

11. Prescreening Grain Samples for GMM Type Evaluation

Source: Charles R. Hurburgh, Jr., Iowa State University

Background: Grain samples used in the accuracy, precision, and reproducibility tests of Section III. **Accuracy, Precision, and Reproducibility Requirements** in the Grain Moisture Meter (GMM) Chapter of *NCWM Publication 14* are selected according to the following procedure:

> The sample set will be screened using the GIPSA official meter model and the air oven. Samples where the official meter model disagrees from the air oven by more than the Handbook 44 acceptance tolerance will be deleted and another sample selected to replace it. No sample set will be used where the standard deviation of the differences between the GIPSA official meter model and the air oven for the 10 samples in a moisture interval exceed one-half the Handbook 44 acceptance tolerance minus 0.1, (i.e., in the 12 % to 14 % interval for corn, the standard deviation of the differences should not exceed (0.4 to 0.1) = 0.3). Finally, any sample that is not within three standard deviations of the mean for the test meter (for either the 2 % or 6 % moisture interval) will be dropped before analysis of the data.

Discussion: The prescreening of samples to eliminate poor predictors is an attempt to remove outliers in advance, so that the test lab does not have to make judgments about outliers. The problem is that samples prescreened on one device will likely have larger rather than smaller variability in the device under test. Error patterns of devices, even when accurately calibrated on average to the reference, will not be the same on individual samples and often will be in opposite directions. The effect is to increase the chances of outliers on the tested device and effectively lessen the chances of the second device passing. Multivariate NIR units are especially prone to this problem. In test categories that have few samples (10 or less) with low tolerances, the impact is quite large and drives calibrations to model the NTEP data rather than the universe of samples.

The following figures illustrate this problem. Figure 11.1 shows air oven moisture vs. meter moisture for two different device types based on data from the 2003 corn crop covering typical market-range moistures. Figure 11.2 shows the error patterns for the two devices, and Figure 11.3 shows that there is no relationship between the two devices on an individual sample error basis.

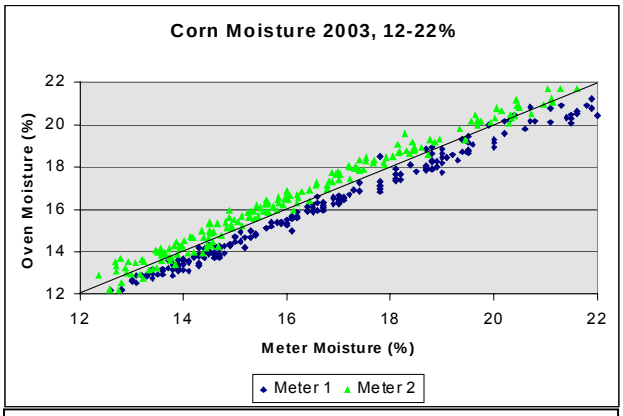


Figure 11.1 - Corn Moisture 2003 – Two Meters

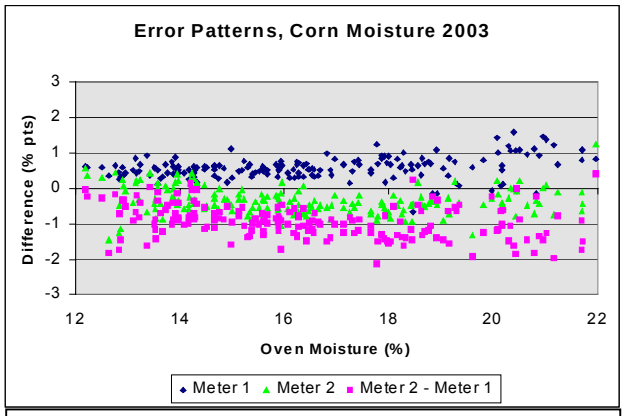


Figure 11.2 – Error Patterns

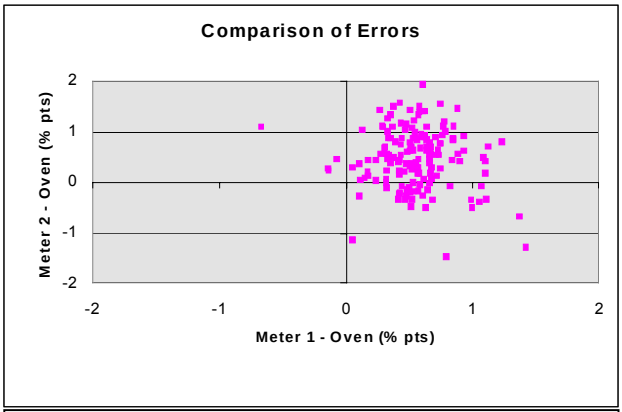


Figure 11.3 – Error Comparison

To overcome this effect, the following options might be considered, recognizing that there has to be a tradeoff between "fairness" and lab procedure complexity:

- Choose the test samples randomly and use statistical outlier tests that incorporate the variability of the reference method data as well as the device data.
- Choose the special set samples (temperature stability) after the accuracy test so these samples can be reasonable predictors on the device being tested. The purpose of temperature samples is to test response to temperature only.
- Choose field inspection samples based on all approved devices.

Dr. Hurburgh remarked that this is an emerging problem that will become more acute as more instruments of different technologies are introduced into the system.

Rich Pierce, GIPSA, reported that the present method of prescreening samples has worked well with test set results agreeing well over time. He said that virtually no samples can be found that will fit all instruments. He has concerns that the topics of Agenda Items 10 and 11 are too general and wonders what impact they might have on NTEP evaluation procedures.

Recommendation: The Sector is asked to review this issue and consider making it a study item for the coming year with formation of an *ad hoc* study group composed of interested Sector members. Because this issue has a major effect on type evaluation, especially when alternative technologies are involved, manufacturers are urged to seriously consider becoming an active participant in this *ad hoc* group should the Sector decide to form one.

Conclusion: Dr. Hurburgh volunteered to chair an *ad hoc* study group to review the issues outlined in Agenda Items 10 and 11. He will send a questionnaire to Sector members and interested parties to determine who is interested in joining the group.

12. Proposed Change to Publication 14 - Assigning Sample Data to Moisture Ranges for GMM Type Evaluation

Source: Charles R. Hurburgh, Jr., Iowa State University

Background: Many of the tests specified in the GMM chapter of NIST Publication 14 require using a defined number of samples in each of three 2 % moisture intervals. For ease of selection, the samples are tested on the Official meter and are assigned to the 2 % moisture intervals based on the Official meter's moisture result. It is simpler to assign ranges in advance based on prescreening because the sample set is defined before the test; however, assignment of sample data to moisture ranges can be a critical item for device evaluation, in that one sample shifted from one range to another can actually affect the pass/fail status of the device in both ranges,

depending on the performance of the device on the other samples in the two ranges. Assigning the samples to 2 % moisture intervals based on air oven moisture results (or, in the case of sample temperature sensitivity tests, based on moisture determined at room temperature by the device under test) will reduce sample set dependence and lessen the impact of individual sample properties resulting in a more realistic test of device characteristics. Assigning samples to 2 % moisture intervals based on their air oven moisture values also matches the basis on which sample data are grouped for analysis in the Phase II On-going Calibration Program.

Recommendation: Dr. Hurburgh proposed an amendment to the Grain Moisture Meter chapter of NIST Publication 14 to specify that test sample sets are to be selected based on air oven moisture values or, in the case of sample temperature sensitivity tests, based on moisture determined at room temperature by the device under test.

Discussion: A question was raised regarding what basis would be used to decide which samples to discard in the event that all extra samples were not needed. Dr. Hurburgh suggested that one possibility was to use only the first 10 samples that fell within the range.

Rich Pierce, GIPSA, was not in favor of changing the existing laboratory procedure. He explained that deliberately selecting samples that are distributed across each 2 % range provides for a better test set. The NTEP Laboratory was not eager to change a procedure that has worked well for years. Dr. Pierce did not see a problem with what is being done procedurally at the present time.

Conclusion: The Sector failed to reach a consensus on the proposed change.

13. Report on OIML TC 17/SC 1 IR59 "Moisture Meters for Cereal Grains and Oilseeds"

Background: This item was included on the Sector's agenda to provide a summary of the activities of OIML TC 17/SC 1. Since June 22, 2001, a TC 17/SC 1 work group has been meeting to review revision to OIML R 59. The most recent meeting of the TC 17/SC 1 work group was held on September 20 - 21, 2004, at the Laboratory National D'Essais (LNE) in Paris, France.

Discussion: The most recent draft of OIML R 59 is the 3rd Committee Draft of OIML R59 "Moisture Meters for Cereal Grain" dated April 2005. This has been submitted by the Secretariat to participating and observing countries for review, comment, and approval of the changes. Copies of the 3rd Committee Draft of OIML R59 and the minutes of the TC 17/SC 1 September 2004 meeting can be found on the NIST Weights and Measures Division website at: http://ts.nist.gov/ts/htdocs/230/235/R59draft.htm.

Diane Lee, NIST Weights and Measures Division, reviewed some of the changes included in the draft and asked Sector members to forward comments to her by September 8, 2005. She reported that concerns relating to the temperature requirements were addressed by inserting the following sentence into Paragraph 5.7.1.:

> If the moisture meter is not able to measure sample temperature, then the operating temperature range shall be defined by national responsible bodies.

And Paragraph 5.7.2. was modified by inserting the sentences:

> The moisture meter shall be able to take into account a temperature difference of at least 10 °C. If the moisture meter is not able to measure sample temperature, the maximum allowable temperature difference between the meter and the sample shall be defined by national responsible bodies.

To address the concerns relating to sample size requirements, Paragraph 6.1.5. was modified to remove the explicit minimum sample size requirements, leaving only the sentence:

> "Meters shall be designed to measure the moisture content of representative size grain samples."

A test section checklist has been added to the draft. It is not a detailed "checklist" like the one in Publication 14.

Ms. Lee also reported that China (the Secretariat of TC 17/SC 1) has indicated that a meeting of TC 17/SC 1 would not be held in 2005. A date for a future meeting has not yet been set.

Steve Patoray, NTEP Director, answered Sector concerns that changes in the 3rd Committee Draft might ultimately allow approval of grain moisture meters that did not meet current Handbook 44 requirements. Mr. Patoray stated that these differences could be dealt with when (and if) the United States enters into a mutual acceptance agreement (MAA) with OIML, the EU or other body.

14. Report on OIML TC 5/SC 2 Document D-SW, "General Requirements for Software Controlled Measuring Devices"

Background: This item was included on the Sector's agenda to provide a summary of the activities of OIML TC 5/SC 2. In December 2004 the Secretariats, Germany and France, for OIML TC 5/SC 2 submitted a pre-draft of the OIML Document "General Requirements for Software-Controlled Measuring Instruments." The Document is intended as guidance for technical committees when addressing software requirements in future OIML Recommendations for software-controlled measuring instruments.

According to the Secretariat, the pre-draft was developed based on responses of OIML TC 5/SC 2 members to a questionnaire, the analysis of existing OIML Recommendations and Documents, the analysis of existing regional software requirements (including the European Measurement Instrument Directive and U.S. Food and Drug Guidance Documents), and ISO/IEC software standards.

Noting that Sections 7, 8, and 9 of the pre-draft document were incomplete, Wayne Stiefel, NIST, Weights and Measures Division, solicited comments on the pre-draft. Interested parties from the United States were asked to review the document in terms of the general approach being proposed and what is practical and applicable in a type approval setting and also to provide detailed comments on specific sections. NIST was particularly interested in comments related to the general and specific requirements for measuring instruments in Section 5, and the type approval examination and evaluation procedures in Section 6. Comments were to be returned to Mr. Stiefel by February 1, 2005, to allow NIST to prepare a collated set of comments by February 28, 2005, for the Secretariat.

The pre-draft document prescribes in Section 5 general requirements for measuring instruments, including:

1. Information display;
2. Means of fraud protection;
3. Hardware features supporting fault detection and durability protection; and
4. Specific requirements for:
   a. Design of interfaces;
   b. Separation of software models performing functions subject to legal control from other functions;
   c. Display or printouts;
   d. Storage of data and transmission via communication systems;
   e. Compatibility of operating systems and hardware portability;
   f. Conformity of production-line devices and software with approved type;
   g. Verification of software updates; and
   h. Procedures for loading updated software and maintaining audit trail.

In addition, the document provides in Section 6 type approval procedures to be used in examination and evaluation of the software including the following items:

1. Software documentation to be supplied;
2. A set of validation methods for software examination, which a Recommendation may use to specify the details of the procedure to assure that the instrument complies with the Recommendation. Software specific validation methods include: examination of the software documentation and specification and validation of design; functional testing of metrological features; functional testing of software features; data flow analysis; code inspection walk-through; and software module testing.

The pre-draft software document, the Secretariat's Response to TC 5/SC 2 Member Comments, and electronic forms for submitting comments are still available on the web at: http://ts.nist.gov/ts/htdocs/230/235/TC5-SC2.htm.

Discussion: Diane Lee, NIST/WMD, reported that a first working draft Recommendation is being prepared by the Secretariats to address comments received on the outline draft. Another meeting of TC 5/SC 2 has tentatively been scheduled for the end of 2005. Commenting on the possible impact of the proposed Recommendation, one manufacturer stated that his company would be opposed to the recommendation if it meant that calibration parameters would need to be made available. Sector members are asked to review this document, especially in terms of its possible impact on OIML R59 "Moisture Meters for Cereal Grain," and with emphasis on what is practical and applicable in a type approval setting.

15. Report on OIML TC 17/SC 8 Protein Draft Recommendation

Background: This item was included on the Sector's agenda to provide a summary of the activities of OIML TC 17/SC 8. Australia, Secretariat of TC 17/SC 8, developed an outline of the Recommendation on Protein Measuring Instruments for Cereal Grain (March 2004) that was circulated to participating nations (Australia, Brazil, Canada, Czech Republic, Germany, Japan, Poland, Republic of Korea, Russia, and the United States) for comments. In the United States the document was circulated to the U.S. National Work Group (USNWG) for comments. OIML TC 17/SC 8, charged with developing an International Recommendation (IR) for Protein Measuring Instruments for Cereal Grain, held its first meeting May 31 – June 1, 2004, in Sydney, Australia. Representatives from Australia, Japan, New Zealand, and the United States attended the meeting. Comments received from the United States and Germany were discussed at the TC 17/SC 8 meeting in Australia. The comments for the most part were accepted. The scope was expanded to include wheat, barley, corn, soybeans, and rice, and changes were made to allow the national measurement authority to determine moisture basis, reference method, instrument monitoring process, and whether or not to test non-indirect measuring devices.

A revised outline of the Recommendation on Protein Measuring Instruments for Cereal Grain, incorporating the changes agreed upon at the 2004 meeting in Sydney, was distributed with the agenda for the Near-Infrared Grain Analyzer Sector's August 2004 meeting for further review and comment. The U.S. work group members provided limited comments to this draft. The comments that were provided to the Secretariat related to parts of the document that appeared to be in conflict with U.S. metrological practice and procedures.

Discussion: A meeting of TC 17/SC 8 was hosted by PTB in Berlin, Germany, June 27 - 28, 2005, to review the May 2005 version of the "Outline of the Recommendation on Protein Measuring Instruments." Diane Lee, NIST/WMD, reported that the first working draft may be available by end of September 2005. Diane will distribute the draft to the sector members along with a request for comments when the first working draft is available. Diane also requested that the Sector review the tolerances in the current draft and provide comments as soon as possible.

16. Naming Conventions for Near-Infrared Analyzer Calibrations

Background: Both the Grain Moisture Meters Code and the Near-Infrared Grain Analyzer Code of NIST Handbook 44 specify that a device must be capable of displaying either calibration constants, a unique calibration name, or a unique calibration version number. The relevant paragraphs are shown below:

Sec. 5.56.(a) Grain Moisture Meters

S.2.4.1. Calibration Version. - A meter must be capable of displaying either calibration constants, a unique calibration name, or a unique calibration version number for use in verifying that the latest version of the calibration is being used to make moisture content and test weight per bushel determinations. (Added 1993) (Amended 1995 and 2003)

Sec. 5.57. Near-Infrared Grain Analyzers

S.2.5.2. Calibration Version. - *An instrument must be capable of displaying either calibration constants, a unique calibration name, or a unique calibration version number for use in verifying that the latest version*

of the calibration is being used to make constituent determinations, and that the appropriate instrument settings have been made for the calibration being used.
[Nonretroactive as of January 1, 2003]
(Amended 2001)

Because the constituent calibrations used on near-infrared (NIR) instruments typically consist of many multi-digit constants, manufacturers of these devices normally elect to identify the calibration version by means of "a unique calibration version number."

Some devices currently use a combination of terms to identify the calibration. For example, the Foss Infratec 1241 uses two levels of calibration identification. At the most basic level, a prediction model (PM) identifier is used for each individual constituent calibration. The PM contains the coefficients used to actually determine constituent content. Prediction models for various constituent calibrations are combined to form application models (AM). AM identifiers appear on the analyzer screen and are also the calibration identifiers used in the audit trail. The AM identifiers may be different for each instrument based on the customer's requirements (e.g., the AM may include constituents not covered by NTEP, such as wheat gluten, or possibly an alternate moisture basis). The PM identifiers, which may be displayed by moving deeper into the menu system, are the same for all instruments.

Two other Foss instruments, Infratec 1227 and Infratec 1229, also make use of AM identifiers which may be different for each instrument depending on the specific combination of prediction models they contain. However, the PM identifiers cannot be displayed on these two instruments.

Discussion/Recommendation: GIPSA implemented the NTEP wheat protein calibration in May and the NTEP barley calibration in July. Foss Infratecs are being used in both the official system and the commercial system. Anticipating that the uniqueness of AM identifiers based on user requirements could lead to field inspection problems on cross-utilized instruments, GIPSA met with Foss last December to discuss how "unique calibration version numbers" might be listed to meet the needs of both the NTEP program and GIPSA, with the objective being to make it obvious that the current NTEP protein and moisture calibrations are being used. The proposed solution would first appear on Foss Certificates of Conformance 95-063A9 and 01-063A5.

The solution proposed by GIPSA is to list the calibrations using the following code:

ABYYMMxx

where AB is the grain identifier
YY is the year the calibration is issued
MM is the month the calibration is issued
xx would be a "version" number from 00 to 99

The ABYYMM part of the calibration would be the unique identifier to ensure that the current calibrations listed on the CC for moisture, oil, and protein are being used. The xx would then be customer specific and it could include constituents not covered by NTEP such as wheat gluten or possibly an alternate moisture basis.

For example, the calibration for durum wheat protein and moisture would be listed as WU050101. The unique identifier of the calibration would be WU0501 to let the field inspector quickly see on any Infratec 1227, 1229, or 1241 that it has the current NTEP moisture and protein calibrations. The 01 would be a version number that is assigned from 00 to 99 that is customer specific and it includes constituents not covered by the NTEP such as wheat gluten or possibly an alternate moisture basis.

The ABYYMMxx is the designation the user and field inspector would see when they walk up to the instrument. The field inspector could go into the instrument menu structure to see the specific moisture equation name, protein equation name, etc., that are bundled together to make up the ABYYMMxx calibration version on the Infratec 1241 with the xx suffix unique to each instrument.

The Sector was asked to consider if there would be any pitfalls or problems with using the above GIPSA proposal to list the calibrations on the CC by the AM number, using this scheme, e.g. WU0501xx, with the note that xx can be any number between 00 and 99.

One Sector member pointed out that the PM calibrations making up the bundle had been approved, but not the AM bundle itself. Several members favored using the proposed naming convention, listing only PM identifiers on the CC for the Infratec 1241 and listing both the AM identifier and, if possible, the included PM identifiers on the CC for the Infratec 1227 and 1229. The Foss representative noted that the Infratec 1227 and 1229 were NTEP approved only for moisture and had not been available for sale for a number of years. It was also pointed out that the AM contains metrologically significant instrument set-up data (the number of replicates for example), so it must appear on the CC in addition to the PM's.

Conclusion: The CC for the Infratec 1241 will list both AM identifiers and the identifiers of all NTEP-approved PM's included in each AM. The CC for the Infratec 1227 and 1229 will list only the AM identifier (in this case called "Calibration Version"). For all of these models, the AM identifier will appear in the form proposed above with only the last two digits, shown as “xx,” varying. Examples of the listings for hard red spring wheat and corn as they appear on the CC's are shown below.

From CC 01-063A5 (Infratec 1241)	**From CC 95-063A9 (Infratec 1227 and 1229)**
Hard Red Spring Wheat Designation: HRS WHEAT Application Model: WS0501xx Moisture Prediction Model: WBMO0024 Moisture Range - Approved: 8 % to 20 % Moisture Range - Pending: 6 % to 24 % Protein Prediction Model: WBPR0028 Native Moisture Basis: 0 % Subsamples: 7 (or more) Slope: 1.0 for all instruments Intercept (Bias): Varies by instrument	**Hard Red Spring Wheat** Designation: HRS WHEAT Calibration Version: WS0501xx Moisture Range - Approved: 8 % to 20 % Moisture Range - Pending: 6 % to 24 % Subsamples: 10 Path Length: 18 mm Slope: 1.0 for all instruments Intercept (Bias): Varies by instrument
Corn Designation: CORN Application Model: CO0501xx Moisture Prediction Model: COMO0011 Moisture Range - Approved: 8 % to 40 % Moisture Range - Pending: 8 % to 46 % Oil Prediction Model: COOI0006 Protein Prediction Model: COPR0007 Native Moisture Basis: 0 % Subsamples: 7 (or more) Slope: 1.0 for all instruments Intercept (Bias): Varies by instrument	**Corn** Designation: CORN Calibration Version: CO0501xx Moisture Range - Approved: 8 % to 44 % Moisture Range - Pending: 8 % to 46 % Subsamples: 10 Path Length: 30 mm Slope: 1.0 for all instruments Intercept (Bias): Varies by instrument

17. Time and Place for Next Meeting

The next meeting is tentatively planned for Wednesday, August 23, and Thursday, August 24, 2006, in the Kansas City, Missouri, area. Sector members are asked to hold both these days open pending determination of exact meeting times and meeting duration. Meetings will be held in one of the meeting rooms at the National Weather Service Training Center if available. Final meeting details will be announced by late April 2006.

If you would like to submit an agenda item for the 2006 meeting, please contact Steve Patoray, NTEP Technical Director, at spatoray@mgmtsol.com, G. Diane Lee, NIST Technical Advisor, at diane.lee@nist.gov, or Jack Barber, Technical Advisor, at jbarber@motion.net by April 1, 2006.

Change Summary

Recommended Amendments and Changes to the Grain Moisture Meters Chapter in the 2005 Edition of Publication 14			
Section Number	**Amendment/Change**	**Page**	**Source**
Appendix D	Correct the Table titled: **Moisture Ranges and Tolerances for Sample Temperature Sensitivity** by inserting a row for Grain Type Long Grain Rough Rice (with Moisture Range 10 % to 16 % and Tolerance Limit 0.45) between the rows for Oats and Medium Grain Rough Rice (see corrected Table).	GMM-43	08/05 Grain Analyzer Sector Item 9

Appendix B

National Type Evaluation Technical Committee
Measuring Sector

October 21 - 22, 2005 – Nashville, Tennessee
Meeting Summary

National Type Evaluation Technical Committee

1. Recommendations to Update NCWM Publication 14 to Reflect Changes to NIST Handbook 44

Source: NIST/WMD

Background: At its Annual Meeting in July 2005, the National Conference on Weights and Measures (NCWM) adopted the following new or modified requirements that will be reflected in the 2006 Edition of NIST Handbook 44 and NCWM Publication 14. These items are part of the agenda to inform the Measuring Sector of the NCWM actions and to recommend changes to NCWM Publication 14.

Recommendation: The Sector was asked to review and, if acceptable, recommend to the NTEP Committee adoption of the following changes to Publication 14 based on changes to NIST Handbook 44:

A. Checklist and Test Procedures for Retail Motor-Fuel Dispensers
Code Reference: S.1.6.1. Indication of Delivery: Electronic Devices

Code Reference: S.1.6.1. Indication of Delivery		
7.25.	Retail devices shall automatically show their initial zero condition and amount delivered up to the nominal capacity of the device. **For electronic devices manufactured on or after January 1, 2006, the measurement, indication of delivered quantity, and the indication of total sales price shall be inhibited until the fueling position reaches conditions necessary to ensure the delivery starts at zero.**	**Yes □ No □ N/A □**
7.26.	~~The initial indication on digital indicators may be "suppressed" or not indicated up to a maximum of 0.03 liter or 0.009 gallon.~~ **For electronic devices manufactured prior to January 1, 2006, the first 0.03 L (or 0.009 gal) of a delivery and its associated total sales price need not be indicated.**	**Yes □ No □ N/A □**

Discussion/Conclusion: The Sector reviewed the proposal and agreed that the change was consistent with the requirements in NIST Handbook 44; however, a manufacturer stated that a test method was needed to provide uniform evaluations by various NTEP laboratories of the ability of a device to meet the requirement. That manufacturer and an NTEP Laboratory official agreed to develop a test method for review by the Sector on the second day of the meeting. The Sector reviewed the proposed method and agreed to add the following test method immediately following Section 7.26 currently on page LMD 26 of NCWM Publication 14 and to forward the amended proposal to the NTEP Committee as written for consideration.

Test Method:

Step	Description		
1	Set unit price on dispenser.		
2	Pressurize system.		
3	Turn the dispenser off		
4	Create void in dispenser hydraulics by opening the fuel nozzle to provide a zero internal pressure. Then close the fuel nozzle.		
5	Activate the dispenser and let the system reset to 8's, blanks then 0's.		
6	With the nozzle closed, watch the main sales display for advancement of total sales and total volume for at least 5 seconds and no more than 10 seconds.		
7	No advancement constitutes a passing test.		
8	Advancement constitutes a failed test.		
9	Replace the fuel nozzle and turn off the dispenser.		
10	Repeat this test 2 more times. Note: The evaluator must be aware that a time delay for this feature may be incorporated		
11	Device passes test	Yes □	No □

B. Checklist and Test Procedures for Specific Criteria for Vehicle-Tank Meters
Code Reference S.1.4.1. Display of Unit Price

Code Reference: S.1.4.1. Display of Unit Price		
25.1.	Means must be provided to display the unit price at which the device is set to compute in proximity to the total computed price display. **(In a device of the computing type, means shall be provided for displaying, in a manner clear to the operator and an observer, the unit price at which the device is set to compute. The unit price is not required to be displayed continuously.)**	**Yes □ No □ N/A □**
25.2.	The unit price shall be expressed in dollars and decimals of dollars using a dollar sign. A common fraction shall not appear in the unit price (e.g., $1.299 not $1.29 9/10).	**Yes □ No □ N/A □**

Discussion/Conclusion: No comments were received on Agenda Item B; therefore, the proposal will be forwarded to the NTEP Committee as written for consideration.

C. Checklist and Test Procedures for Specific Criteria for Vehicle-Tank Meters
Code Reference S.2.4. Zero Set-Back Interlock, Vehicle-Tank Meters, Electronic

Code Reference: S.2.4. Zero Set-Back Interlock, Vehicle-Tank Meters, Electronic		
26.4.	**Except for vehicle-mounted metering systems used solely for the delivery of aviation fuel, a device shall be so constructed that after individual or multiple deliveries at one location have been completed, an automatic interlock system shall engage to prevent a subsequent delivery until the indicating and, if equipped, recording elements have been returned to their zero position. For individual deliveries, if there is no product flow for 3 minutes, the transaction must be completed before additional product flow is allowed. The 3-minute timeout shall be a sealable feature on an indicator.**	**Yes □ No □ N/A □**

Discussion/Conclusion: No comments were received on Agenda Item C; therefore, the proposal will be forwarded to the NTEP Committee as written for consideration.

D. Field Evaluation and Permanence Test for Vehicle Tank Meters

Code Reference: N.4.2. Special Tests (except Milk-Measuring Systems), N.4.5. Product Depletion Test, and T.4. Product Depletion Test

Product Depletion Test

Before vehicle-mounted applications are listed on an NTEP Certificate of Conformance, the meter must pass a product depletion test. This policy applies to all meter technologies (e.g., Coriolis mass flow meters, turbine meters, and positive displacement meters) even if the meter will never be installed on trucks with more than a single compartment. The permanence test still applies ~~to~~ includeing the throughput and ~~with~~ a duration of at least 20 days. Ideally, this test should be performed with a multiple-compartment vehicle; however, a single-compartment vehicle may be used to simulate the product depletion test by running the tank empty~~, if a multiple-compartment vehicle is unavailable, a single-compartment vehicle may be used~~ to simulate the product depletion ~~test by running the tank empty~~.

Purpose: A product depletion test verifies the proper operation of air elimination means when the storage tank for the product being measured is pumped dry. This test is necessary for meters that may drain a tank completely, such as a vehicle-tank meter.

Test Procedure:

For a multi-compartment tank:

Begin the test from a compartment (ideally the largest compartment) containing an amount of fuel equal to or less than one-half the nominal capacity of the prover being used. Operate the meter at the normal full flow rate until the compartment is empty. There are several methods for determining that the compartment is empty. There may be a significant change in the sound of the pump. ~~Someone may visually watch for~~ There may be visual evidence that the compartment ~~to~~ has run dry. The meter may stop entirely or may begin to move in jumps (pause, resume running, then pause, then run again.)

Continue the test until the meter indication stops entirely for at least 10 seconds. If the meter stops for 10 seconds or more, proceed to Step 3. If the meter indication fails to stop entirely for a period of 10 seconds, continue to operate the system for 3 minutes.

Close the valve from the empty compartment, and, if top filling, close the nozzle or valve at the end of the delivery hose. Open the valve from another compartment containing the same product. Carefully open the valve at the end of the delivery hose. Pockets of vapor or air may cause product to splash out of the prover. The test results may not be valid if product is splashed out of the prover. Appropriate eye protection is required, but caution is still necessary.

Continue delivering product at the normal full flow rate until the liquid level in the prover reaches the nominal capacity of the prover.

Close the delivery nozzle or valve, stop the meter, allow any foam to settle, then read the prover sight gauge as quickly as practical.

Compare the meter indication with the actual delivered volume in the prover.

Calculate the meter error, apply ~~special~~ **Product Depletion** test tolerance, and determine whether or not the meter error is acceptable.

Test Procedure:

For a single-compartment tank:

The test of a single-compartment tank is easier to accomplish if there is a quick-connect hose coupling between the compartment valve and the pump that supplies product to the meter. If the system does not have a quick-connect coupling between the compartment and the meter, an additional source of sufficient product at the test site is required.

Without a quick-connect coupling:

1. Begin the test with the compartment containing an amount of fuel equal to or less than one-half the nominal capacity of the prover being used. Operate the meter at the normal full flow rate until the supply tank is empty. There are several methods for determining that the tank is empty. There may be a significant change in the sound of the pump. Someone may visually watch for the tank to run dry. The meter may stop entirely or may begin to move in jumps (pause, resume running, then pause, then run again).

Continue the test until the meter indication stops entirely for at least 10 seconds. If the meter stops for at least 10 seconds, proceed to Step 3. If the meter indication fails to stop entirely for at least 10 seconds, continue to operate the system for 3 minutes.

Close the compartment valve and the delivery nozzle or valve if top filling. Stop the pump and load sufficient product from the alternate source into the supply compartment for the meter being tested. Allow the product to stand in the compartment for a brief time to allow entrained vapor or air to escape.

Open the compartment valve and restart the pump without resetting the meter to zero. Carefully open the nozzle or valve at the end of the delivery hose. Pockets of vapor or air may cause product to splash out of the prover. The test results may not be valid if product is splashed out of the prover. Appropriate eye protection is required, but caution is still necessary.

Continue delivering product at the normal full flow rate until the liquid level in the prover reaches the nominal capacity of the prover.

Close the delivery nozzle or valve, stop the meter, allow any foam to settle, then read the prover sight gauge as quickly as practical.

Compare the meter indication with the actual delivered volume in the prover.

Calculate the meter error, apply ~~special~~ **Product Depletion** test tolerance, and determine whether or not the meter error is acceptable.

With a quick-connect coupling:

2. During a normal full flow test run, close the compartment valve at approximately one-half of the nominal prover capacity. Then slowly and carefully disconnect the quick-connect coupling allowing the pump to drain the supply line.
3. Continue the test until the meter indication stops entirely for at least 10 seconds. If the meter fails to stop entirely for at least 10 seconds, continue to operate the system for 3 minutes.
4. If the meter stops for at least 10 seconds or after 3 minutes, close the delivery nozzle or valve at the end of the delivery hose if top filling.
5. Reconnect the quick-connect coupling and open the compartment valve.

6. Carefully open the nozzle or valve at the end of the delivery hose. Pockets of vapor or air may cause product to splash out of the prover. The test results may not be valid if product is splashed out of the prover. Appropriate eye protection is required, but caution is still necessary.
7. Continue delivering product at the normal full flow rate until the liquid level in the prover reaches the prover's nominal capacity.
8. Close the delivery nozzle or valve, stop the meter, allow any foam to settle, then read the prover sight gauge as quickly as practical.
9. Compare the meter indication with the actual delivered volume in the prover.
10. Calculate the meter error, apply ~~special~~ **Product Depletion** test tolerance, and determine whether or not the meter error is acceptable.

Discussion/Conclusion: The Sector reviewed this item and agreed that the term "special test" should be changed to "product depletion test" throughout the Product Depletion Test procedure of Section "C" Field Evaluation and Permanence Test For Vehicle-Tank; Except for LPG, Cryogenic, and CO_2 Meters, on pages LMD 65 through LMD 68 in the 2005 Edition of NCWM Publication 14, to be consistent with NIST Handbook 44 Paragraphs N.4.5. and T.4. A manufacturer of aircraft refueling equipment suggested that the exception in N.4.5. for devices used exclusively for the delivery of aircraft fuel should be added to the checklist. The Sector agreed that the first paragraph of the Product Depletion Test should be modified as follows and the modified proposal be forwarded to the NTEP Committee for consideration:

Except for devices used exclusively for the delivery of aircraft fuel, ~~B~~before vehicle-mounted applications are listed on an NTEP Certificate of Conformance, the meter must pass a product depletion test. This policy applies to all meter technologies (e.g., Coriolis mass flow meters, turbine meters, positive displacement meters) even if the meter will never be installed on trucks with more than a single compartment. The permanence test still applies to include the throughput and with a duration of at least 20 days. Ideally, this test should be performed with a multiple-compartment vehicle; however, a single-compartment vehicle may be used to simulate the product depletion test by running the tank empty if a multiple-compartment vehicle is unavailable.

Carry-over Items

2. Product Family Tables for MAG Meters, Ultrasonic Meters, and Turbine Meters

Source: Turbine Meter Work Group

At the meeting this Agenda Item was combined with Agenda Item 4. (See Agenda Item 4 for the conclusion.)

3. Acceptable Symbols or Wording to Identify Unit Price, Total Price, and Quantity on a Retail Motor-Fuel Dispenser

Source: Maryland NTEP Laboratory

Background: At the June 2002 NTEP Laboratory Meeting, one of the participating laboratories requested guidance on acceptable symbols or wording to identify the unit price, total sale, and quantity delivered on a retail motor-fuel dispenser. The laboratories recommended the question be added to the 2002 Measuring Sector Agenda.

At the 2002 Sector Meeting, a work group was formed to address this issue. No input has been received from the work group assigned to develop this issue following the 2002 Sector Meeting.

At its 2004 Meeting, the Sector agreed the NTEP laboratories should develop a list of acceptable symbols at the next laboratory meeting.

Recommendation: The NTEP laboratories submitted to the Sector the following list of acceptable words and symbols for price and volume declarations on RMFDs for inclusion in Publication 14:

List of Price and Quantity Markings on RMFDs		
Total Sale	**Unit Price**	**Delivered Quantity**
Acceptable	**Acceptable**	**Acceptable**
Total Sale $ 000.00 (Preferred) **Total $ 000.00** **This Sale $ 000.00** **Purchase $ 000.00** **Total Purchase $ 000.00** **Sale $ 000.00**	**Price Per Gallon $ 0.000** **Price/Gallon $ 0.000** **$/Liter $0.000** **Price Per Unit $ 0.000** **Price/Unit $0.000** **Unit Price $0.000 (Preferred)** **$/Gal $0.000** **$/L $0.000**	**Gallons (Preferred)** **Gal** **Liters (Preferred)** **L**
Unacceptable	**Unacceptable**	**Unacceptable**
$ 000.00	**Price Per Vol** **Price/Vol** **$/G $0.000** **$/l $0.000**	**G** **l (lower case L for liter)** **Unit** **Volume** **Vol**

Discussion/Conclusion: The Sector reviewed the proposed table and agreed with the concept; however, some members believed that the letter "l" (lower case L for liter) should be acceptable because it is recognized and allowed in NIST Handbook 44, General Code Table 1. Representation of Units. Another member was concerned that if something was identified in the List of Price and Quantity Marking for RMFDs as preferred, some NTEP laboratories might allow only those markings. The Sector modified the table containing the List of Price and Quantity Markings for RMFDs as shown below and recommended the modified table be forwarded to the NTEP Committee for consideration.

List of Price and Quantity Markings on RMFDs[1]		
Total Sale	**Unit Price**	**Delivered Quantity**
Acceptable	**Acceptable**	**Acceptable**
Total Sale $ 000.00 **Total $ 000.00** **This Sale $ 000.00** **Purchase $ 000.00** **Total Purchase $ 000.00** **Sale $ 000.00**	**Unit Price $0.000** **Price Per Gallon $ 0.000** **Price/Gallon $ 0.000** **Price Per Liter $ 0.000** **Price/ Liter $ 0.000** **Price Per Unit $ 0.000** **Price/Unit $0.000**	**Gallons** **Gal** **Liters** **L or l**
Unacceptable	**Unacceptable**	**Unacceptable**
$ 000.00	**Price Per Vol** **Price/Vol** **$/G $0.000** **$/Gal $0.000** **$/Liter $0.000** **$/L $0.000** **$/l $0.000**	**G** **Unit** **Volume** **Vol**
[1]Does not apply to receipt format		

New Items

4. Product Families for Positive Displacement (PD) Meters

Source: Murray Equipment, Tuthill and Turbine Meter Work Group

Background/Discussion: During several NTEP evaluations conducted since the last Sector meeting, concerns were expressed by manufacturers that the product families table for positive displacement meters need to be revised and updated to reflect changes in metering designs submitted for evaluation and products currently found in the marketplace. One meter manufacturer questioned the appropriateness of keeping aviation fuel as a separate "Product Subgroup" when the physical characteristics of those products are so similar to other refined products. Another manufacturer wanted to know what testing was required to include "biodiesel" on a CC (Certificate of Conformance). Another question asked whether or not the evaluation must be conducted using biodiesel fuel with the highest specific gravity available or could testing be conducted using a product with very similar characteristics that is available in the manufacturer's test facility.

Recommendation: Agenda Item 2 of the meeting agenda distributed prior to the meeting contained a proposal for a family products table for turbine meters. Agenda Item 4 contained two proposals for changes to the product family table for PD meters. At the Sector meeting Items 2 and 4 were combined for discussion and consideration. The Sector reviewed and discussed two alternative proposals for PD meters and the proposal for turbine meters to determine if any of the proposals contained appropriate recommendations for modifications to Section "C" and the Product Family Table for Positive Displacement Meters in the LMD Technical Policy of Publication 14. Two proposals were received to

address some of the issues for PD meters. The first proposal submitted by Paul Glowacki (Murray Equipment, Inc.) is shown below as proposal alternative number 1. The second proposal submitted by Maurice Forkert (Tuthill Transfer System) is shown below as proposal alternative number 2. The proposed family products table submitted by the turbine meters work group is shown following proposal alternative number 2.

Proposal Alternative Number 1:

Proposal Overview

The driving factor behind this proposal is simplification of the Positive Displacement (PD) Meter Product Family chart to more accurately reflect the reality that PD meters are not sensitive to the differences between typical products, but rather that viscosity and specific gravity are the determining metrological considerations.

Thus, the product families are simplified to group liquids in one large category (Normal Liquids) and several additional categories for specialized liquids where other factors are considered.

There are four components to this proposal. Part I is the revised product family table itself to replace the one currently in Pub 14. Part II contains revised language that covers the requirements for testing meters for new certificates according to the table. Part III provides language for the requirements to convert existing certificates to the new proposed categories. Part IV provides revised language to harmonize certain requirements for vehicle-tank meters and stationary meters.

Part I
Proposed Product Table Group

PRODUCT GROUP TABLE				
Product Groups	**Typical Products**	**Viscosity (Centipoise [cP])**	**Specific Gravity**	**Minimum Test Requirements to Cover Products in Group***
Normal Liquids	Water; Alcohols; Glycols; Water Mixes thereof; Agricultural Liquid Fertilizers, Liquid Feeds, Crop Chemicals; Chemicals: Petroleum Products; Solvents; Suspensions; Vegetable Oils	0.3 to 2500	to 2.5	* All products in this group within the range of lowest specific gravity/viscosity to the highest specific gravity/viscosity tested are covered
Compressed Liquids	Propane, Butane, Ethane, Freon 11, Freon 12, Freon 22, NH3, etc.	0.1 to 0.5	0.3 to 0.68	Test with one product in the group to cover all products in this group
Compressed Gases	CNG	0.1 to 0.5	0.6 to 0.8	Test with one product in the group to cover all products in this group
Cryogenic Liquids (BP 152 C) and Liquefied Natural Gas	Liquefied Oxygen, Nitrogen, etc.	0.1 to 0.5	0.07 to 1.4	Test with one product in the group to cover all products in this group
Heated Products (above 50 C)	Bunker C, Asphalt, etc.	25 to 2420	0.8 to 1.2	* All products in this group within the range of lowest specific gravity/viscosity to the highest specific gravity/viscosity tested are covered
*If only a single product is selected for test in Normal Liquids or Heated Products groups, the resulting CC will cover only that product.				
NOTE: The Typical Products listed in this table are not limiting or all-inclusive; there may be other products and product trade names, which fall into a product family and product subgroup.				

Part II
Proposed Language For Product Family Requirements

C. Product Families for All Meters

When submitting a meter for evaluation, the applicant must specify the product or product group for which the meter is being submitted. To cover a product group, NTEP tests must be conducted with two liquids within the product group. Upon test completion, a range of specific gravities/viscosities between the specific gravities/viscosities of the two liquids attained within the product group will be covered on the Certificate of Conformance (CC). The specific gravity/viscosity range within the product group can be expanded by conducting an NTEP test with a liquid of higher or lower specific gravity/viscosity than is covered on the existing CC.

The above does not apply to the following product groups: compressed gasses, compressed liquids, and cryogenic liquids. In case of these product groups, only one liquid within each of these groups is required to undergo an NTEP evaluation and, upon completion, the entire product group will be covered on the CC.

Multi-product applications in which the meter is to be used without a change to zero or calibration to dispense different products must include a multi-product test if:

(1) specific gravity varies by more than 0.1 for devices measuring in mass; or
(2) viscosity varies by more than 1 cP (below 25 cP) for devices measuring in volume.

The multi-product initial test will be performed on the meter without a change to zero or calibration using multiple products having a difference in specific gravity of at least 0.2 for devices measuring in mass and 2 centipoise for devices measuring in volume. For mass measuring devices which will be used to dispense products having a specific gravity range greater than 0.2 and for volume measuring devices which will be used for products having a viscosity range greater than 2 cP, the multi-product testing must be performed over the anticipated range before multi-product applications will be included on the CC. For the multi-product testing, throughput testing will be performed on one or more combinations of products; testing for the subsequent test will be conducted on all products used during the initial test without a change to zero or calibration. Multi-product testing requirements do not apply to devices used to dispense a product such as propane in which the product varies in normal operation.

Part III
Proposed Requirements for Conversion of Pre-existing NTEP Certificates of Conformance to New Requirements

NTEP Liquid Measuring Device Certificates of Conformance issued before 2006, will be reclassified according to specific gravity and viscosity ratings matching the Product Groups and corresponding Sub-Groups listed on the existing manufacturer's Certificate of Conformance:

Current Certificate Product Family and Subgroup Listing	2006 Certificate Product Group Table Classification
Fuel, Lubricant, Oil Products, and Edible Oil Products Refined Products Aviation Fuels Vegetable Oils	Normal Liquids: Specific Gravity 0.70 to 2.5 Viscosity 0.3 cP to 2500 cP
Solvents General Solvents Chlorinated Solvents	
Alcohol & Glycols Alcohols, Glycols, Water Mixes	
Water Water	
Agricultural Liquids Clear Liquid Fertilizer, Crop Chemicals, Flowables, Crop Chemicals, Suspension Fertilizer, Liquid Feed	
Chemicals Chemicals	
Liquefied Compressed Gases Fuels and Refrigerants NH3	Compressed Liquids: Specific Gravity 0.3 to 0.68 Viscosity 0.1 cP to 0.5 cP
Liquefied Compressed Gases Fuels and Refrigerants CNG	Compressed Gases Specific Gravity 0.6 to 0.8 Viscosity 0.1 cP to 0.5 cP
Liquefied Compressed Gases Fuels and Refrigerants Liquefied Oxygen, Nitrogen	Cryogenic Liquids and Liquefied Natural Gas Specific Gravity 0.7 to 1.4 Viscosity 0.1 cP to 0.5 cP
Fuel, Lubricant, Oil Products, and Edible Oil Products Refined Products Bunker C, Asphalt	Heated Products: Specific Gravity 0.8 to 1.2 Viscosity 25 cP to 2420 cP

NOTE: In the event pre-2006 NTEP Liquid-Measuring Device testing was performed on a single meter with products having a Specific Gravity and/or Viscosity greater or lower than the Specific Gravity and Viscosity of the reclassification, the product's actual Specific Gravity and Viscosity can be used to meet the requirements for the 2006 manufacturer's Liquid Measuring Device Certificate of Conformance.

NOTE: A table of sample specific gravity and viscosity values for typical products would be included in Pub 14. This is not included in the proposal and would have to be developed at some point for inclusion with the other changes.

EXAMPLES:

1) Current Certificate lists a meter model approved for Solvents. The 2006 classification is: Normal Liquids Specific Gravity 0.70 to 2.5 and Viscosity 0.3 cP to 2500 cP.
2) Current Certificate lists a meter model approved for Solvents and Agricultural Liquids. The 2006 Classification is: Normal Liquids Specific 0.70 to 2.5 Viscosity 0.3 cP to 2500 cP.
3) Current Certificate lists a meter model approved for Solvents, Agricultural Liquids and Asphalt. 2006 Classification is Normal Liquids and Heated Products Specific 0.70 to 2.5 Viscosity 0.3 cP to 2500 cP.
4) Current Certificate lists a meter model approved for Asphalt and Solvents. The 2006 Classification is Normal Liquids Specific Gravity 0.70 to 2.5 Viscosity 0.3 cP to 2500 cP and Heated Products Specific Gravity 0.8 to 1.2 Viscosity 25 cP to 2420 cP.

Part IV
Revised Language for Vehicle-Mounted and Stationary Meter Application Requirements

Publication 14 LMD Section R, page 8

Vehicle-Mounted and Stationary Applications of the Meter

If a meter evaluation is conducted in a vehicle-mounted ***or*** stationary application and the meter successfully meets the NTEP accuracy and performance requirements for both vehicle-mounted and stationary applications, then both applications can be included on the NTEP Certificate of Conformance.

Proposal Alternative Number 2:

This proposal is based on several factors:

A) Level playing field. The regulation should not be dependent on the type of liquid-measuring device. All types of liquid-measuring devices should be required to meet the same regulation or not be approved. I am proposing this Family of Liquids for all types of liquid-measuring devices.

B) End use of a liquid is not a metrological issue. It is not an issue of measurement if vegetable oil ends up on the dinner table or in the crankcase. My proposal does not recognize the end use of a liquid. The marketplace regulations take care of that aspect.

C) The effect of a measuring device on a liquid is not a metrological issue. The viscosity/specific gravity can affect the performance of a meter. It is a marketplace issue if the liquid is Newtonian, Thixotropic, Dilatant, Colloidal, or Rheopectic.

D) Liquid-measuring devices that are approved for a range of viscosities/specific gravities may encounter liquids with solids in that range. The marketplace will be quick to eliminate the measuring device if the measuring device is not able to handle the solids.

E) This is a move to bring our regulations closer in alignment with Canada and OIML regulations.

C. Product Families for All Meters

When submitting a meter for evaluation, the applicant must specify the product or product group for which the meter is being submitted. To cover a product group, NTEP tests must be conducted with two liquids within the product group. Upon test completion, a range of specific gravities/viscosities between the specific gravities/viscosities of the two liquids attained within the product group will be covered on the Certificate of Conformance (CC). The specific gravity/viscosity range within the product group can be expanded by conducting an NTEP test with a liquid of higher or lower specific gravity/viscosity than is covered on the existing CC.

The above does not apply to the following product groups: compressed gasses, compressed liquids, and cryogenic liquids. In case of these product groups, only one liquid within each of these groups is required to undergo an NTEP evaluation and, upon completion, the entire product group will be covered on the CC.

Multi-product applications, in which the meter is to be used without a change to zero or calibration to dispense different products, must include a multi-product test if:

a) specific gravity varies by more than 0.1 for devices measuring in mass;
b) viscosity varies by more than 1 cP (below 25 cP) for devices measuring in volume.

The multi-product initial test will be performed on the meter without a change to zero or calibration using multiple products having a difference in specific gravity of at least 0.2 for devices measuring in mass and 2 cP for devices measuring in volume. For mass measuring devices which will be used to dispense products having a specific gravity range greater than 0.2 and for volume measuring devices which will be used for products having a viscosity range greater

than 2 cP, the multi-product testing must be performed over the anticipated range before multi-product applications will be included on the CC. For the multi-product testing, throughput testing will be performed on one or more combinations of products; testing for the subsequent test will be conducted on all products used during the initial test without a change to zero or calibration. Multi-product testing requirements do not apply to devices used to dispense a product such as propane in which the product varies in normal operation.

Product Group Table				
Product Groups	**Typical Products**	**Viscosity (Centipoise [cP])**	**Specific Gravity**	**Minimum Test Requirements to Cover Products in Group***
Normal Liquids	Water;Alcohols; Glycols; Water Mixes thereof; Agricultural Liquids, Fertilizers, Seeds, and Herbicides; Chemicals:Petroleum Products; Solvents; Suspensions	0.3 to 2500	0.7 to 2.5	* All products in this group within the range of lowest specific gravity/viscosity to the highest specific gravity/viscosity tested are covered
Compressed Liquids	Propane, Butane, Ethane, Freon 11, Freon 12, Freon 22, NH3, etc.	0.1 to 0.5	0.3 to 0.68	Test with one product in the group to cover all products in this group
Compressed Gases	CNG	0.1 to 0.5	0.6 to 0.8	Test with one product in the group to cover all products in this group
Cryogenic Liquids (BP 152 C) and Liquefied Natural Gas	Liquefied Oxygen, Nitrogen, etc.	0.1 to 0.5	0.07 to 1.4	Test with one product in the group to cover all products in this group
Heated Products (above 50 C)	Bunker C, Asphalt, etc.	25 to 2420	0.8 to 1.2	* All products in this group within the range of lowest specific gravity/viscosity to the highest specific gravity/viscosity tested are covered
*If only a single product is selected for test in Normal Liquids or Heated Products groups, the resulting CC will cover only that product.				
NOTE: The Typical Products listed in this table are not limiting or all-inclusive; there may be other products and product trade names, which fall into a product family and product subgroup.				

The turbine meters work group proposed amending Section "P" of the LMD Technical Policy in Publication 14 to add the following:

P. Product Families for Turbine Meters

To facilitate the certification of turbine meters, product family groups have been created to eliminate the necessity of testing each product individually. Turbine meter product groups are defined by viscosity, density, lubricity, and chemical/physical compatibility.

When submitting a turbine meter for evaluation, the applicant must specify the product or product group(s) for which the meter is being submitted. A meter that is successfully tested on one product will be approved for use with that product only. If the meter is successfully tested on a lower viscosity product and then successfully tested on a higher viscosity product in the same product group, then all products in that group falling within the range of viscosities can be included on the Certificate.

Bi-directional turbine meters must be tested in "forward" and "reverse" flow directions. Turbine meters must be tested in the mounting orientation(s) required. Horizontal/vertical-mounted turbine meters must be tested in both horizontal and vertical orientation, and in "forward" and "reverse" flow, if they are bi-directional. Vertically-mounted turbine meters that flow in only one direction must be described in the Certificate.

The flow range of turbine meters is affected by line size, viscosity, and specific gravity. Therefore, the criteria for inclusion of meters from 50 % to 200 % min/max flow rate of the meter tested cannot be applied to all line size, viscosity, and specific gravity requirements, with respect to turbine meters.

One method to include smaller line sizes with higher viscosities is to use multiple meter factors to linearize the performance curve.

Another method to include smaller line sizes with higher viscosities is to increase the minimum flow rate.

The following calculation can be used to determine if a smaller line size needs adjustment because of viscosity. The method of adjustment must be described in the Certificate.

Sizing Ratio = Liquid Viscosity (centistokes) / Nominal Line Size (inches)

Sizing Ratio = 1 or less, use the normal 10 % minimum flow rate. (10:1 turndown)
= Above 1 to 1.5 use 20 % minimum flow rate. (5:1 turndown)
= Above 1.5 exceeds the Minimum Discharge Rate of Wholesale Devices and cannot be included.

Multiple meter factors can also be used to achieve extended flow rate and to linearize the performance curve with low and high specific gravity applications. This use must be described in the Certificate.

The product or product group(s), meter orientation, and flow directions covered by the Certificate are to be identified on page 1 of the Certificate of Conformance. More detailed information, including typical products to be covered, number of meter factors required for smaller line size, higher viscosity, low/high specific gravity and extended flow rate are to be included in the application section of the Certificate.

Turbine Meter Product Group Table			
Product Groups	**Typical Products[1]**	**Viscosity (centistokes [cSt])**	**Specific Gravity[2]**
Refined Petroleum Products	diesel[3], gasoline[4], kerosene, jet fuel		
	distillate, fuel oil, stove oil	0.5 to 200	0.64 to 1.1
Alcohols & Glycols	ethanol, methanol, butanol,		
	isopropyl, isobutyl	0.6 to 54	0.6 to 1.6
	ethylene glycol, propylene, glycol		
Compressed Liquefied Gases	LPG, anhydrous-ammonia,		
	propane, butane, freon	0.2 to 0.6	0.3 to 0.68
Cryogenic Liquids (BP 152 C) and Liquefied Natural Gas	Liquefied Argon, Oxygen, Nitrogen	0.1 to 0.4	0.8 to 1.4

[1]NOTE: The Typical Products listed in this table are not limiting or all-inclusive; there may be other products and product trade names, which fall into a Product Group.
[2]The specific gravity of a liquid is the ratio of its density to that of water at standard conditions, usually 4 °C (or 20 °C) and 1 atmosphere. The density of water at standard conditions is approximately 1 000 kg/m3 (or 998 kg/m3).
[3]Diesel fuel blends (biodiesel) with up to 20 % vegetable or animal fat/oil.
[4]Gasoline includes oxygenated fuel blends with up to 15 % oxygenate.

The source for some of the viscosity value information is in the Industry Canada – Measurement Canada "Classification of Liquids for the Approval of Liquid Meters", Bulletin V-16 (rev. 2), Issue Date: 2005-05-13, Effective Date: 2005-07-01.

Discussion: On the first day of the meeting, because of the common issue presented in the proposals, the Sector agreed to combine Agenda Items 2 and 4 for discussion. One manufacturer of RMFDs stated that the proposals in Item 4 to include alcohols in the product group of "normal liquids" that also included water, petroleum products, chemicals, and vegetable oils was not appropriate. Another manufacturer stated that if a company could make a single device that can pass type evaluation for both alcohols and petroleum products, that company should not be penalized because another company must submit different models to measure each product. After considerable discussion it was apparent that while each of the proposals had merit, no individual proposal satisfied all of the concerns of the members. It was suggested that the parties responsible for each of the proposals and other interested parties meet after the conclusion of the first day of the Sector Meeting to work on a compromise document that would satisfy all participants.

Conclusion: On the second day of the meeting the volunteer group presented a proposal for consideration by the entire Sector membership present at the meeting. After a few minor editorial changes, the Sector agreed to forward proposed revisions to NCWM Publication 14 Section "C" Product Families for Positive Displacement (PD) Meters, Section "D" Product Families for Mass Flow Meters (MFM), and a new Product Families Table designed to include product family testing requirements for PD meters, MFM, and Turbine Meters in a single table, as shown below, to the NTEP Committee for consideration.

C. Product Families for ~~Positive Displacement~~ Meters

When submitting a ~~positive displacement~~ meter for evaluation, the manufacturer must specify the product family and ~~subgroup(s)~~ critical parameters for which the meter is being submitted. ~~From the list of liquids constituting a product family and subgroup, at least two liquids representing of the high and low key characteristics of that subgroup are to be selected for use in the test. If the meter successfully completes all accuracy and permanence tests with these products, the resulting Certificate of Conformance will cover the entire subgroup of the product family.~~

The product family and the specific product subgroup covered by the Certificate are to be identified on Page 1 of the Certificate of Conformance. More detailed information, including the typical product types found in the subgroup, is to be included in the Application section of the Certificate.

Tests to be Conducted
Test A – Products must be individually tested and noted on the Certificate of Conformance.
Test B – To obtain coverage for a range of products within a family: Test with one product having a low specific gravity; test with a second product having a high specific gravity. The Certificate of Conformance will cover all products in the family within the specific gravity range tested.
Test C – To obtain coverage for a range of products within a family: Test with one product having a low viscosity; test with a second product having a high viscosity. The Certificate of Conformance will cover all products in the family within the viscosity range tested.
Test D – To obtain coverage for a product family: Test with one product in the product family.
Test E – To obtain coverage for a range of products within a family: Test with one product having a low kinematic viscosity; test with a second product having a high kinematic viscosity. The Certificate of Conformance will note coverage for all products in the family within the kinematic viscosity range tested.

Mass Meter Product Family & Test Requirements (Test B unless otherwise noted)	PD Product Family & Test Requirements (Test C unless otherwise noted)	Turbine Product Family & Test Requirements (Test A unless otherwise noted)	Typical Products[1]	Viscosity[5] (Centipoise [cP]) (Centistokes [cSt])	Specific Gravity[2]
Normal Liquids	Fuels, Lubricants, Industrial and Food Grade Liquid Oils	Fuels, Lubricants, Industrial and Food Grade Liquid Oils (Test E permitted)	Diesel Fuel[3], Distillate, Gasoline[4], Fuel Oil, Kerosene, Light Oil, Spindle Oil, Lubricating Oils, SAE Grades, Bunker Oil, 6 Oil, Crude Oil, Asphalt, Vegetable Oil, Biodiesel above B20, AVgas, Jet A, Jet A-1, Jet B, JP4, JP5, JP7, JP8, Cooking Oils, Sunflower Oil, Soy Oil, Peanut Oil, Olive Oil, etc.	0.3 to 2500 0.44 to 2270	0.68 to 1.1
	Solvents General	Solvents General (Test E permitted)	Acetates, Acetone, Esters, Ethylacetate, Hexane, MEK, Naphtha, Toluene, Xylene, etc.	0.3 to 7 0.5 to 4.38	0.6 to 1.6
	Solvents Chlorinated	Solvents Chlorinated	Carbon Tetra-Chloride, Methylene-Chloride, Perchloro-Ethylene, Trichloro-Ethylene, etc.	0.3 to 7 0.5 to 4.38	0.6 to 1.6
	Alcohols, Glycols, & Water Mixes Thereof	Alcohols, Glycols, & Water Mixes Thereof (Test E permitted)	Ethanol, Methanol, Butanol, Isopropyl, Isobutyl, Ethylene glycol, Propylene glycol, etc.	0.3 to 7 0.5 to 4.38	0.6 to 1.6

Mass Meter Product Family & Test Requirements (Test B unless otherwise noted)	PD Product Family & Test Requirements (Test C unless otherwise noted)	Turbine Product Family & Test Requirements (Test A unless otherwise noted)	Typical Products[1]	Viscosity[5] (Centipoise [cP]) (Centistokes [cSt])	Specific Gravity[2]
	Water (Test D permitted)	Water (Test D permitted)	Tap Water, Deionized, Demineralized, Potable, Nonpotable	1.0 1.0	1.0
	Clear Liquid Fertilizers	Clear Liquid Fertilizers	Nitrogen Solution; 28 %, 30 % or 32 %; 20 % Aqua-Ammonia; Urea; Ammonia Nitrate; N-P-K solutions; 10-34-0; 4-10-10; 9-18-9; etc.	10 to 400 10 to 275	1.0 to 1.45
	Crop Chemicals	Crop Chemicals	Herbicides: Round-up, Touchdown, Banvel, Treflan, Paraquat, Prowl, etc	4 to 400 5.7 to 333	0.7 to 1.2
	Crop Chemicals	Crop Chemicals	Fungicides, Insecticides, Adjuvants, Fumigants	0.7 to 100 1 to 83	0.7 to 1.2
	Flowables	Flowables	Dual, Bicep, Marksman, Broadstrike, Doubleplay, Topnotch, Guardsman, Harness, etc.	20 to 900 20 to 750	1 t o 1.2
	Crop Chemicals	Crop Chemicals	Fungicides		
	Crop Chemicals	Crop Chemicals	Micronutrients		
	Suspensions Fertilizers	Suspensions Fertilizers	3-10-30; 4-4-27, etc.	20 to 900 20 to 560	1.0 to 1.6
	Liquid Feeds	Liquid Feeds	Liquid Molasses; Molasses plus Phos Acid and/or Urea; etc.	10 to 50 000 8 to 33 000	1.2 to 1.5
	Chemicals	Chemicals	Sulfuric Acid, Hydrochloric Acid, Phosphoric Acid, etc	1.0 to 296 0.9 to 160	1.1 to 1.85
Heated Products (above 50 °C)	Heated Products (above 50 °C)	Heated Products (above 50 °C)	Bunker C, Asphalt, etc.		0.8 to 1.2

Mass Meter Product Family & Test Requirements (Test B unless otherwise noted)	PD Product Family & Test Requirements (Test C unless otherwise noted)	Turbine Product Family & Test Requirements (Test A unless otherwise noted)	Typical Products[1]	Viscosity[5] (Centipoise [cP]) (Centistokes [cSt])	Specific Gravity[2]
Compressed Liquids – (Test D)	Fuels and Refrigerants	Fuels and Refrigerants – (Test E)	LPG, Propane, Butane, Ethane, Freon 11, Freon 12, Freon 22, etc.	0.1 to 0.5 0.3 to 0.77	0.3 to 0.65
	NH[3]	NH[3]	Anhydrous Ammonia Note: If a meter is certified for anhydrous ammonia the same meter type may also be certified for LPG without further testing	0.1 0.2	0.56 to 0.68
Compressed Gases – (Test D)	Note: CNG is only included in Section 3.37 Mass Flow Meters of Handbook 44		CNG		0.6 to 0.8
Cryogenic Liquids and Liquefied Natural Gas – (Test D)	Cryogenic Liquids and Liquefied Natural Gas – (Test A)	Cryogenic Liquids and Liquefied Natural Gas – (Test D)	Liquefied Oxygen, Nitrogen, etc.		0.07 to 1.4

[1]*NOTE: The Typical Products listed in this table are not limiting or all-inclusive; there may be other products and product trade names, which fall into a product family. Water and a product such as stoddard solvent or mineral spirits may be used as test products in the fuels, lubricants, industrial, and food- grade liquid oils product family.*

[2]The specific gravity of a liquid is the ratio of its density to that of water at standard conditions, usually 4 °C (or 40 °F) and 1 atm. The density of water at standard conditions is approximately 1000 kg/m3 (or 998 kg/m3)

[3]Diesel fuel blends (biodiesel) with up to 20 % vegetable or animal fat/oil.

[4]Gasoline includes oxygenated fuel blends with up to 15 % oxygenate.

[5] Kinematic viscosity is measured in centistokes. $$Centistokes = \frac{Centipoise}{Specific\,Gravity}$$

Source for some of the viscosity value information is in the Industry Canada - Measurement Canada "Liquid Products Group, Bulletin V-16-E (rev. 1), August 3, 1999."

D. Additional Criteria for Product Families for Mass Flow Meters

~~**When submitting a direct mass flow meter for evaluation, the manufacturer must specify the product or product group for which the meter is being submitted. To cover a product group, NTEP tests must be conducted with two liquids within the product group.**~~ When two liquids of different densities are tested, the Certificate of Conformance (CC) for the mass flow meter will cover approved liquids with a specific gravity range from 0.1 above the highest

specific gravity tested to 0.1 below the lowest specific gravity tested. The specific gravity range within the product group can be expanded by conducting an NTEP test with a liquid of higher or lower specific gravity than is covered on the existing CC.

~~**The above does not apply to the following product groups: compressed gases, compressed liquids, and cryogenic liquids. In the case of these product groups, only one liquid within each group is required to undergo an NTEP evaluation and, upon completion, the entire product group will be covered on the existing CC.**~~

Multi-product applications (that is, applications in which the meter will be used without a change to zero or calibration to dispense different products which vary in specific gravity by more than 0.1) must include a multi-product test. The multi-product initial test will be performed on the meter without a change to zero or calibration using multiple products having a difference in specific gravity of at least 0.2. For devices which will be used to dispense multiple products having a specific gravity range greater than 0.2, the multi-product testing must be performed over the anticipated range before multi-product applications will be included on the CC. For the multi-product testing, throughput testing will be performed on one or a combination of the products; testing for the subsequent test will be conducted on both products without a change to zero or calibration. The CC for a mass flow meter will cover multi-product applications where the specific gravity of a single product, or multiple products, varies by the amount tested throughout the entire approved specific gravity range of the meter. Example: Where a meter has been tested and a certificate issued for multi-product with one liquid having a specific gravity of 0.7 and another liquid having a specific gravity of 1.0 and the meter is subsequently tested to expand the range with a liquid having a specific gravity of 1.6, the allowed variation of gravities covered by the CC will be from 0.7 through 1.6. Multi-product testing requirements do not apply to meters used to dispense a product such as propane in which the density varies in normal operation.

5. Permanence Test for "Wholesale Meters" in Publication 14

Source: NTEP Laboratories

Background/Discussion: At the 2005 meeting of the NTEP laboratories, it was noted that Publication 14 does not contain permanence test criteria for wholesale positive displacement meters. The NTEP labs developed the following proposal for submission to the Sector for review.

Recommendation: The Sector reviewed the following proposal for possible forwarding to the NTEP Committee for approval and addition to the 2006 edition of Publication 14.

Proposal: Modify Section D of the Publication 14 LMD Checklist as follows:

D. <u>Initial Evaluation and Permanence Tests for Wholesale Positive Displacement (PD) Meters</u>

<u>The following tests are considered to be appropriate for metering systems on Wholesale PD Meters:</u>

1. **<u>Four test drafts at each of five flow rates.</u>**

2. **<u>Only one meter is required for the initial test, after which the meter will be reevaluated for permanence. The minimum throughput criterion for these meters is the maximum rated flow in units per minute x 2000</u>**

3. **<u>Following the period of use, the tests listed above are to be repeated. All results must be within acceptance tolerances.</u>**

Tests of Automatic Temperature Compensating Systems on Wholesale Meters (Code Reference T.2.3.4.)

The difference between the meter error for results determined with and without the automatic temperature compensating system activated shall not exceed:

1. 0.2 % of the test draft for mechanical automatic temperature compensating systems; and

2. 0.1 % of the test draft for electronic automatic temperature compensating systems.

The results of each test shall be within the applicable "acceptance" or maintenance tolerance.

Repeatability on Wholesale Meters (Code Reference T.2.3.3.)

When multiple tests are conducted at approximately the same flow rate, the range of the test results for the flow rate shall not exceed 40 % of the absolute value of the maintenance tolerance, and the results of each test shall be within the applicable tolerance. This tolerance does not apply to the test of the automatic temperature compensating system.

Tests for repeatability shall include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors, such as temperature, pressure, and flow rate, are reduced to the extent that they will not affect the results obtained.

Discussion/Conclusion: A mass flow meter manufacturer suggested that the throughput requirement should be replaced with a time requirement of 60 days between the initial evaluation and the permanence test. The NTEP laboratories were opposed to that change because it did not include any criteria for an amount of use between tests. After some discussion the proposal for a 60-day time frame was withdrawn. Another member suggested that the reference to the Canadian throughput requirement should be removed because at this time there is no mutual recognition program between the United States and Canada for meters. The Sector agreed that the reference to Canadian throughput requirements should be editorially removed from all permanence test section in NCWM Publication 14. The Sector agreed to forward the proposal for test requirements for wholesale meters to the NTEP Committee for consideration.

6. NTEP Tolerances for Meters with Different Flow Rates when Using Different Sized Provers

Source: Maryland NTEP Laboratory

Background: During an evaluation of a high-gallonage RMFD with marked flow rates of 60 gpm maximum and 12 gpm minimum, the Maryland NTEP laboratory found that the actual flow rate on the lowest setting of the automatic nozzle was 6 GPM. Several questions need to be addressed regarding this situation.

N.4.2.2 (b) in the LMD Code states “Devices with a marked minimum flow rate shall have a "special" test performed at or near the marked minimum flow rate.”

If a 10-gal test measure is used, what is the appropriate tolerance applicable? Table T.2. in the LMD Code stipulates that the special test tolerance is 0.5 %, which is 11.55 cu in on a ten-gal test draft; however, there is a footnote that states that the applicable acceptance tolerance for a special test when using a 10-gal test draft is 5.5 cu in. Which tolerance should be applied during an NTEP evaluation? If a prover with a capacity greater than 10 gallons is used, does it provide a tolerance advantage over tests conducted with a 10-gal test measure?

G-T.1. (e) states that acceptance tolerances apply to all equipment undergoing type evaluation. Does that mean that special test tolerances are not applicable during NTEP testing?

At its 2005 meeting the Sector agreed to forward a proposal to modify G-T.1. as shown below to the NCWM and Southern Weights and Measures Association S&T Committees for consideration.

Proposal: Modify H44 Sec. 1.10 Paragraphs G-T.1. Acceptance Tolerances (e) and N.4.2.2. Retail Motor-Fuel as follows:

G-T.1. Acceptance Tolerances. - Acceptance tolerances shall apply to:

(a) equipment to be put into commercial use for the first time;

(b) equipment that has been placed in commercial service within the preceding 30 days and is being officially tested for the first time;

(c) equipment that has been returned to commercial service following official rejection for failure to conform to performance requirements and is being officially tested for the first time within 30 days after corrective service;

(d) equipment that is being officially tested for the first time within 30 days after major reconditioning or overhaul; and

(e) equipment undergoing type evaluation (special test tolerances are not applicable).

At the 2005 NCWM Annual Meeting, the Meter Manufacturers Association (MMA) indicated that they had not understood that the proposal submitted to the Committee from the Measuring Sector would only apply to all types of liquid-measuring devices submitted for NTEP evaluation. The MMA stated that without special test tolerances most meters, especially those installed in vehicle-mounted applications, would not meet tolerances for low flow tests during both field and NTEP evaluations. The Committee agreed to make the proposal an information item to allow the MMA and the Measuring Sector time to further develop the proposal and resubmit it to the Committee for consideration.

Prior to the addition of Table T.2. to the Handbook 44 LMD Code in 2002, the applicable tolerances in T.2.1. for "retail devices" including RMFDs were the same for normal and special tests. Special test tolerances were only applicable to "wholesale devices" measuring liquids other than agri-chemicals and asphalt. The Sector was asked to consider a recommendation that limits the application of special test tolerances in the LMD code to only those devices where it was appliclble prior to 2002.

Recommendation: The Sector reviewed the following proposal for possible forwarding to the NCWM S&T Committee for consideration along with a recommendation that the NCWM S&T Committee General Code item to amend G-T.1. be withdrawn.

Proposal: Modify Table T.2. Accuracy Classes for Liquid-Measuring Devices Covered in NIST Handbook 44 Section 3.30. as follows:

Table T.2. Accuracy Classes for Liquid Measuring Devices Covered in NIST Handbook 44 Section 3.30.				
Accuracy Class	**Application**	**Acceptance Tolerance**	**Maintenance Tolerance**	**Special Test Tolerance[1]**
0.3	Petroleum products delivered from large capacity (flow rates over 115 L/min (30 gal/min))** devices including motor fuel devices, heated products at or greater than 50 °C asphalt at or below temperatures 50 °C, all other liquids not shown where the typical delivery is over 200 L (50 gal)	0.2 %	0.3 %	0.5 %
0.3A	Asphalt at temperatures greater than 50° C	0.3 %	0.3 %	0.5 %
0.5*	Petroleum products delivered from small capacity (at 4 L/min (1 gal/min) through 115 L/min (30 gal/min))** motor-fuel devices, agri-chemical liquids, and all other applications not shown where the typical delivery is # 200 L (50 gal)	0.3 %	0.5 %	0.5%
1.1	Petroleum products and other normal liquids from devices with flow rates** less than 1 gal/min and devices designed to deliver less than 1 gal	0.75 %	1.0 %	1.25%

*For 5 gal and 10 gal test drafts, the tolerances specified for Accuracy Class 0.5 in the table above do not apply. For these test drafts, the maintenance tolerances on normal and special tests for 5 gal and 10 gal test drafts are 6 cu in and 11 cu in, respectively. Acceptance tolerances on normal and special tests are 3 cu in and 5.5 cu in.

** Flow rate refers to designed or marked maximum flow rate.

[1] Special Test Tolerances are not applicable to Retail Motor-fuel Dispensers or to devices used for the measurement of agri-chemical liquids and asphalt.

(Added 2002)

Discussion/Conclusion: The Sector reviewed the proposal that would remove the special test tolerance for retail motor-fuel dispensers and wholesale meters measuring agri-chemicals and asphalt. The Sector agreed that some devices measuring agri-chemicals and asphalt should have a special test tolerance. The current definition of "retail" in Handbook 44 now applies to devices that, prior to 2004 when the definition of "retail" was changed, would have met the definition for a wholesale device because of their rated flow. When the wholesale devices measuring agri-chemicals and asphalt were classified as "wholesale," they were permitted to have a special test tolerance. Those same devices may now meet the criteria to be classified as "retail"; however they should still be allowed to have a special test tolerance. The Sector agreed to limit the proposal to only RMFDs and to forward the modified proposal shown below to the NCWM S&T Committee for consideration.

Table T.2. Accuracy Classes for Liquid-Measuring Devices Covered in NIST Handbook 44 Section 3.30.				
Accuracy Class	**Application**	**Acceptance Tolerance**	**Maintenance Tolerance**	**Special Test Tolerance[1]**
0.3	Petroleum products delivered from large capacity (flow rates over 115 L/min (30 gal/min))** devices including motor fuel devices, heated products at or greater than 50 °C asphalt at or below temperatures 50 °C, all other liquids not shown where the typical delivery is over 200 L (50 gal)	0.2 %	0.3 %	0.5 %
0.3A	Asphalt at temperatures greater than 50 °C	0.3 %	0.3 %	0.5 %
0.5*	Petroleum products delivered from small capacity (at 4 L/min (1 gal/min) through 115 L/min (30 gal/min))** motor-fuel devices, agri-chemical liquids, and all other applications not shown where the typical delivery is # 200 L (50 gal)	0.3 %	0.5 %	0.5%
1.1	Petroleum products and other normal liquids from devices with flow rates** less than 1 gal/min and devices designed to deliver less than 1 gal	0.75 %	1.0 %	1.25%
*For 5 gal and 10 gal test drafts, the tolerances specified for Accuracy Class 0.5 in the table above do not apply. For these test drafts, the maintenance tolerances on normal and special tests **(except for retail motor-fuel dispensers)** for 5 gal and 10 gal test drafts are 6 cu in and 11 cu in, respectively. Acceptance tolerances on normal and special tests **(except for retail motor-fuel dispensers)** are 3 cu in and 5.5 cu in. **[1] Special Test Tolerances are not applicable to retail motor-fuel dispensers.** ** Flow rate refers to designed or marked maximum flow rate.				

(Added 2002)**(Amended 200X)**

7. Marking Requirements for 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices

Source: NTEP Laboratories

Background/Discussion: At the 2005 meeting of the NTEP laboratories it was recommended that the location of markings requirement from the LMD code be added to Sections 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices and 3.37. Mass Flow Meters.

Recommendation: The Sector was asked to review the following proposal and, if it agreed, to forward it to the NCWM S&T Committee for consideration.

Proposal: Add a new paragraph S.4.3. Location of Marking Information; Retail Motor-Fuel Dispensers to Handbook 44 Section 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices and renumber subsequent paragraphs as follows:

S.4. Marking Requirements.

S.4.1. Limitation of Use. - If a device is intended to measure accurately only products having particular properties, or to measure accurately only under specific installation or operating conditions, or to measure accurately only when used in conjunction with specific accessory equipment, these limitations shall be clearly and permanently stated on the device.

S.4.2. Discharge Rates. - A device shall be marked to show its designed maximum and minimum discharge rates. The marked minimum discharge rate shall not exceed:

(a) 20 L (5 gal) per minute for stationary retail devices, or

(b) 20 % of the marked maximum discharge rate for other retail devices and for wholesale devices.
(Amended 1987)

Note: See example in Section 3.30. Liquid-Measuring Devices Code, Paragraph S.4.4.1.
(Added 2003)

S.4.3. Location of Marking Information; Retail Motor-Fuel Dispensers. - The required marking information in the General Code, Paragraph G-S.1. Identification shall appear as follows:

(a) within 60 cm (24 in) to 150 cm (60 in) from the base of the dispenser;

(b) either internally and/or externally provided the information is permanent and easily read; and

(c) on a portion of the device that cannot be readily removed or interchanged (i.e., not on a service access panel).

Note: ***The use of a dispenser key or tool to access internal marking information is permitted for Retail Liquid-Measuring Devices.***
[*Nonretroactive as of January 1, 200X]

S.4.~~3~~4. Temperature Compensation. - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recorded representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).

Conclusion: There was no discussion on agenda Item 7 to add a new paragraph S.4.3. and renumber subsequent paragraphs. The Sector agreed to forward the proposal to the NCWM S&T Committee for consideration.

8. Marking Requirements for 3.37. Mass Flow Meters

Source: NTEP Laboratories

Background/Discussion: At the 2005 meeting of the NTEP laboratories it was recommended that the location of markings requirement from the LMD Code be added to Sections 3.32. LPG and Anhydrous Ammonia and 3.37. Mass Flow Meters

Recommendation: The Sector was asked to review the following proposal and, if it agreed, to forward the proposal to the S&T Committee for consideration.

Proposal: Add a new paragraph S.5.1. Location of Marking Information; Retail Motor-Fuel Dispensers to Handbook 44 Section 3.37. Mass Flow Meters and renumber subsequent paragraphs as follows:

S.5. Markings. - A measuring system shall be legibly and indelibly marked with the following information:

(a) pattern approval mark (i.e., type approval number);

(b) name and address of the manufacturer or his trademark and, if required by the weights and measures authority, the manufacturer's identification mark in addition to the trademark;

(c) model designation or product name selected by the manufacturer;

(d) nonrepetitive serial number;

(e) *the accuracy class of the meter as specified by the manufacturer consistent with Table T.2.;** (Added 1994)

(f) maximum and minimum flow rates in pounds per unit of time;

(g) maximum working pressure;

(h) applicable range of temperature if other than –10 °C to +50 °C;

(i) minimum measured quantity; and

(j) product limitations, if applicable.

*[*Nonretroactive as of January 1, 1995]*

S.5.1. Location of Marking Information; Retail Motor-Fuel Dispensers. - The required marking information in the General Code, Paragraph G-S.1. Identification shall appear as follows:

(d) within 60 cm (24 in) to 150 cm (60 in) from the base of the dispenser;

(e) either internally and/or externally provided the information is permanent and easily read; and

(f) on a portion of the device that cannot be readily removed or interchanged (i.e., not on a service access panel).

Note: ***The use of a dispenser key or tool to access internal marking information is permitted for Retail Liquid-Measuring Devices.***
[*Nonretroactive as of January 1, 200X]

S.5.~~1~~2. Marking of Gasoline Volume Equivalent Conversion Factor. - A device dispensing compressed natural gas shall have either the statement "One Gasoline Liter Equivalent (GLE) is Equal to 0.678 kg of Natural Gas" or "One Gasoline Gallon Equivalent (GGE) is Equal to 5.660 lb of Natural Gas" permanently and conspicuously marked on the face of the dispenser according to the method of sale used.
(Added 1994)

Conclusion: There was no discussion on agenda Item 8 to add a new paragraph S.5.1. and renumber subsequent paragraphs. The Sector agreed to forward the proposal to the NCWM S&T Committee for consideration.

9. Value of the Smallest Unit for Liquid Measuring Devices (LMD) Code

Source: WMD

Background/Discussion: In 2004 the definition of a "retail device" in Handbook 44 was modified to include all devices used to measure product for the purpose of sale to the end user. At that time the S&T Committee believed all affected parties were aware of the proposal and there was no opposition to the change. However, after the 2005 Edition of Handbook 44 was published and distributed, WMD received a comment from a weights and measures jurisdiction that routinely tests large meters used to deliver fuel to fishing fleets and other large ocean-going boats. The jurisdiction stated that the average delivery is approximately 300 000 gal and may be as much as 1 000 000 gal. At the present time value of the smallest unit of the indicated delivery for these devices is 1 gal. Because the fuel is being delivered to the end user, the jurisdiction believes this is a retail delivery and that Handbook 44 now requires a smallest unit of delivery of not more than 0.5 L (1 pt) for these devices. WMD recommends a change to Handbook 44 is appropriate to recognize a larger minimum unit of delivery for large fuel deliveries.

Recommendation: The Sector was asked to review the following proposal and if it agreed, to forward it to the S&T Committee for consideration. It was also suggested that as an alternative, the Sector could decide it was more appropriate to form a work group to develop suitability criteria for all meters, including such things as minimum and maximum flow rate, minimum resolution, minimum measured quantity, etc., for an application and forward the concept to the S&T Committee as a developing issue.

Proposal: Modify Handbook 44, Section 3.30., S.1.2.3. Value of Smallest Unit as follows:

> **S.1.2.3. Value of Smallest Unit.** - The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:
>
> (a) 0.5 L (~~1 pt~~ 0.1 gal) on ~~retail~~ devices making a delivery of less than 1000 gal;
>
> (b) 5 L (1 gal) on ~~wholesale~~ devices making a delivery of 1000 gal or more.
>
> This requirement does not apply to manually operated devices equipped with stops or stroke-limiting means. (Amended 1983 and 1986)

Discussion/Conclusion: The Sector supported the concept of the proposal; however, during the discussion of the item, a recommendation was made to base the smallest unit requirement on meter size (marked flow rate) rather than the size of the delivery. The Sector agreed and modified the proposal as shown below. The Sector agreed to forward the modified proposal to the NCWM S&T Committee for consideration.

Proposal: Modify Handbook 44, paragraph S.1.2.3. as follows:

> **S.1.2.3. Value of Smallest Unit.** - The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:
>
> (a) 0.5 L **(~~1 pt~~ 0.1 gal)** on ~~**retail**~~ devices **with a maximum rated flow rate of 750 L/min (200 gal/min) or less.**
>
> (b) 5 L (1 gal) on ~~**wholesale**~~ devices **with a maximum rated flow of more than 750 L/min (200 gal/min).**
>
> This requirement does not apply to manually operated devices equipped with stops or stroke-limiting means. **(Amended 1983, ~~and~~ 1986, and 200X)**

10. Value of the Smallest Unit for Vehicle-Tank Meters (VTM) Code

Source: Maryland NTEP Laboratory

Background/Discussion: Paragraph S.1.1.3. in the VTM Code requires the smallest unit of indicated delivery to be not greater than 0.5 L (0.1 gal) for deliveries on meters with a rated maximum flow rate of 500 L/min (100 gal/min) or less used for retail deliveries of liquid fuel and 5 L (1 gal) for all other meters (except milk-metering systems). VTMs with rated maximum flow rates greater than 100 gal/min are being introduced into the marketplace; however, the amount of the increase in flow rate and the amount of product being delivered do not warrant a tenfold increase in the required value of the smallest unit of measurement.

Recommendation: The Sector was asked to review the following proposal and consider forwarding it to the NCWM S&T Committee for consideration.

Proposal: Modify Handbook 44, Section 3.31., Paragraph S.1.1.3. Value of the Smallest Unit. as follows:

> **S.1.1.3. Value of Smallest Unit.** - The value of the smallest unit of indicated delivery, and recorded delivery if the meter is equipped to record, shall not exceed the equivalent of:
>
> (a) 0.5 L (0.1 gal) or 0.5 kg (1 lb) on milk-metering systems
>
> (b) 0.5 L (0.1 gal) on meters with a rated maximum flow rate of ~~500~~ **750** L/min (~~100~~ **200** gal/min) or less used for retail deliveries of liquid fuel, or

(c) 5 L (1 gal) on other meters.

Discussion/Conclusion: The Sector reviewed a proposal to increase the rated maximum flow rate criteria in S.1.1.3. from 100 gal/min to 200 gal/min. Some manufacturers of aviation refueling systems suggested that these systems need a separate criterion due to the unique nature of their application. The Sector agreed with the aviation refueler manufacturers and agreed to forward the modified proposal shown below to the NCWM S&T Committee for consideration.

Proposal: Modify Paragraph S.1.1.3. as follows:

S.1.1.3. Value of Smallest Unit. - The value of the smallest unit of indicated delivery, and recorded delivery if the meter is equipped to record, shall not exceed the equivalent of:

(a) 0.5 L (0.1 gal) or 0.5 kg (1 lb) on milk-metering systems**,**

(b) 0.5 L (0.1 gal) on meters with a rated maximum flow rate of ~~**500**~~ **750** L/min **(**~~**100**~~ **200** gal/min) or less used for ~~**retail**~~ deliveries of liquid fuel, or
(**Amended 200X)**

(c) 5 L (1 gal) on meters with a rated maximum flow of 575 L/min (150 gal/min) or more used for aviation refueling systems,
(Added 200X)

(~~**c**~~**d)** 5 L (1 gal) on other meters.

11. Add Fluid Ounce to NIST Handbook 44, Section 3.30. Liquid-Measuring Devices, Paragraph S.1.2. Units

Source: NTEP Laboratories

Background: NTEP issued a CC for a liquid-measuring device that displays its deliveries in fluid ounces. The device currently in use always makes a delivery of 4 fl oz. A weights and measures jurisdiction would not approve the use of the device stating that it did not comply with S.1.2. in the LMD Code. Paragraph S.1.2. allows binary submultiples of the liter or gallon; therefore an indication of 1/32 gallon would be acceptable. The laboratories agreed that consumers would understand 4 fl oz better than 1/32 of a gallon and suggested the Measuring Sector review the following proposal and consider recommending it to the NCWM S&T Committee for adoption into Handbook 44.

Recommendation: Modify Handbook 44, Section 3.30, S.1.2. Units, as follows:

S.1.2. Units. - A liquid-measuring device shall indicate, and record if the device is equipped to record, its deliveries in liters, gallons, quarts, pints, **fluid ounces** or binary-submultiples or decimal subdivisions of the liter or gallon. (Amended 1987, 1994)

Conclusion: The Sector supported the proposal to modify S.1.2. and agreed to forward the proposal a recommended to the NCWM S&T Committee for consideration.

12. Reorganize Publication 14 to Clarify Tests of Electronic Cash Registers (ECR) for Retail Motor-Fuel Dispensers (RMFD)

Source: NTEP Laboratories

Background: At the 2005 NTEP Laboratory Meeting, one of the Measuring labs stated that the LMD section of Publication 14 was not well organized. During an NTEP evaluation the evaluator must continuously flip from one section of the publication to another to find all the requirements applicable to the device under test. The lab also stated

that the evaluation of an ECR interfaced with a RMFD required the use of both the ECR Checklist and the LMD Checklist in order to find all the applicable requirements. The California laboratory volunteered to provide a draft reorganization of LMD Checklist and a draft of a revised ECR checklist with the applicable requirements added from the LMD checklist. Drafts of the reorganized LMD checklist and the revised ECR checklist are available from NIST WMD upon request.

Recommendation: The Sector was asked to review the drafts submitted and, if agreeable, to forward them to the NTEP Committee for approval as revisions to the 2006 version of Publication 14.

Conclusion: The Sector supported the concept provided all NTEP laboratories and other interested parties conduct a thorough review of the proposed changes before they are incorporated in NCWM Publication 14. The NTEP Director, Steve Patoray, agreed to post the draft changes as shown in Appendices A and B on the NCWM website.

13. Next Meeting

The Sector discussed the time and location for its next meeting. The Sector supported having its next meeting immediately prior to the Annual Meeting of the Southern Weights and Measures Association which will be held in Annapolis, Maryland. Maryland Weights and Measures offered to host a tour of the Maryland NTEP facility in the morning of the first day of the meeting.

14. Multi-point Calibration (linearization) for Meters

Source: NTEP Laboratories

Background/Discussion: At the 2005 NTEP Laboratory Meeting, one of the labs noted a concern that some meter manufacturers are using multi-point calibration (linearization) to expand the range of flow rates for a meter submitted for type evaluation. Neither Handbook 44 nor Publication 14 prohibit or provide requirements for the use of multi-point calibration for meters. The laboratories agreed that, if multi-point calibrations are used during an evaluation, it must be noted on the CC for the device and that installations must include that feature. The laboratories also agreed that multi-point calibration should only be used to extend the range of flow rates beyond a turn-down ratio of 5 to 1. Any meter submitted for evaluation utilizing multi-point calibration must be able to meet test requirements over a turn-down ratio of 5 to 1 without multi-point calibration and then would be tested using multi-point calibration to expand the range of flow rates beyond a ratio of 5 to 1.

At the time of distribution of this agenda a specific proposal for addition to Handbook 44 or Publication 14 had not been submitted by any of the NTEP laboratories. This item is included on the agenda to alert the members of a concern and to solicit input on the subject that may appear as an agenda item at the next Sector Meeting.

Conclusion: The Sector discussed the concerns of the NTEP laboratories and agreed that the use of multi-point calibration should be restricted to only extending the turn-down range to a ratio of greater than 5 to 1. During the meeting the Sector developed a modification to Section "G" of the technical policy on page LMD – 6 of the 2005 edition of NCWM Publication 14 as shown below and agreed to forward the recommended change to the NTEP Committee for consideration.

Modify Publication 14 Technical Policy Section G. Range of Data Points as follows:

G. Range of Data Points

The number and types of tests to be run on devices covered under this checklist are specified in the Checklist and Test Procedures section and the Field Evaluation and Permanence Tests for Metering Systems section of this checklist. However, if the NTEP laboratory feels that there is a performance or other Handbook 44 related problem and provides reasons to support this belief, the laboratory is given the latitude to require additional testing.

Multi-point calibration shall be blind and integral (programmed during manufacture and not accessible in the field) to the measuring element or it shall not be used to establish the minimum flow range required (5:1 or 10:1, etc., as required). Programmable multi-point calibration can be used to extend the range of a system beyond the minimum range required for the measuring element. The use of multi-point calibration to extend the range will be noted on the CC.

15. Audit Trail Remote Configuration

Source: NTEP Laboratories

Background/Discussion: At the 2005 NTEP Laboratory Meeting, one of the labs noted a concern that some retail motor-fuel dispensers do not meet the sealing requirements for Category 1 devices because of the definition of remote configuration capability in Handbook 44. Remote configuration capability is defined as "the ability to adjust a weighing or measuring device or change its sealable parameters from or through some other device that is not itself necessary to the operation of the weighing or measuring device or is not a permanent part of that device." The mechanism for changing blend ratios on some dispensers, while not required for normal operation of the device, is not a "permanent" part of the device.

At the time of distribution of the agenda a specific proposal for addition to Handbook 44 or Publication 14 had not been submitted by any of the NTEP laboratories. This item was included on the agenda to alert the members of a concern and to solicit input on the subject that may appear as an agenda item at the next Sector Meeting.

The Sector discussed NIST Handbook 44 codes for liquid-measuring devices that do not have specific provisions for electronic sealing (i.e., audit trails) in the code, such as the Vehicle-Tank Meters Code or the LPG and Anhydrous Ammonia Metering-Devices Code. At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic sealing capability with remote configuration capability. They are currently seeking an NTEP Certificate of Conformance (CC) for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing, but it is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment. Accordingly, NTEP has made an *ad hoc* decision to apply the criteria in the LMD Code to these devices; however, the manufacturers would prefer specific language similar to that in the Liquid-Measuring Devices (LMD) Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former device Category 2 device.

Conclusion: The Sector agreed that the decision to remove Category 2 from the LMD Code and the Mass Flow Meters Code should be reversed and that provisions for electronic sealing should be added to liquid-measuring devices codes 3.30. Liquid-Measuring Devices, 3.31. Vehicle-Tank Meters, 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices, 3.34. Hydrocarbon Gas Vapor-Measuring Devices, 3.35. Milk Meters, and 3.38. Carbon Dioxide Liquid-Measuring Devices and agreed to forward that proposal to the Committee for consideration. The technical advisor, Dick Suiter, NIST, will develop the specific proposal for the recommended change to each of the codes listed above.

16. New Product Application for Meters and Formula for the Proper Calculation of Relative Error

(Note: This item was added to the agenda during the Sector meeting.)

Source: FMC Smith Meter

Recommendation: Amend Section "F" of the LMD Technical Policy in Publication 14 as shown in the proposal below:

Proposal: If a manufacturer wants to add a new product to an existing family of meters, the following criteria will be applied:

1. If the accuracy class in NIST Handbook 44 for the new product falls within the same NIST Handbook 44 accuracy class or a more strict accuracy class than the most strict accuracy class covered on the Certificate of Conformance, the entire range of meters sizes will be covered for product tested.

2. If the accuracy class in NIST Handbook 44 for the new product falls within a less strict NIST Handbook 44 accuracy class than the most strict accuracy class covered by the Certificate, the new product will only be covered for meters meeting the requirements of paragraph E, Meters Sizes to be included on a Certificate of Conformance.

If the product being added is from a family of products that has been previously subjected to the permanence test, then the requirement for a permanence test may be waived provided the initial test of the product being added meets following conditions:

a) the results of the initial test were not questionable; and
b) multi-point calibration may not be used to add the new product.

Make the following editorial change to NCWM Publication 14 LMD Checklists to add the formula for the proper calculation of relative error

Percent Error = [(Indicated – Actual) / Actual] x 100

Where "Actual" = the amount delivered corrected for appropriate influence factors.

Discussion/Conclusion: At the Sector meeting, FMC Smith Meter requested that Section "F" be modified, as shown above, to allow the addition of a new product to a CC that already includes product(s) from the same product family as the product to be added. FMC Smith Meter also suggested that the formula for proper calculation of relative error should be added to all of the LMD checklists to provide uniformity between the NTEP laboratories when calculating errors during NTEP evaluations. The Sector reviewed the proposed change to Section "F" and agreed to forward the proposal to the NTEP Committee for consideration. The Sector also agreed that the formula for proper calculation of relative error should be added to all of the LMD checklists to provide uniformity between the NTEP laboratories when calculating errors during NTEP evaluations.

Appendix A
2005 Measuring Sector Meeting Attendees

Name	Company/Agency	Address	Telephone #	E-Mail Address
Beattie, Dennis	Measurement Canada	4th Floor 400 St Mary Avenue Winnipeg, Manitoba, Canada R3C 4K5	(204) 983-8910	Beattie.dennis@ic.gc.ca
Belue, Mike	Belue Associates	1319 Knight Drive Murfreesboro, TN 37128	(615) 867-1010	bassoc@aol.com
Beyer, Joseph	Liquid Controls	105 Albrecht Drive Lake Bluff, IL 60044	(847) 283-8300	jbeyer@idexcorp.com
Butler, Jerry W.	North Carolina Dept of Agriculture	1050 Mail Service Center Raleigh, NC 27699-1050	(919) 733-3313	Jerry.butler@ncmail.net
Buxton, Joe	Daniel Measurement Control	19267 Hwy 301 N Statesboro, GA 30461	(912) 489-0253	Joe.buxton@emersonprocess.com
Castro, Gary	State of California Meas Stds	8500 Fruitridge Road Sacramento, CA 95826	(916) 229-3049	gcastro@cdfa.ca.gov
Cleary, Michael	California Div of Meas Stds	6790 Florin Perkins Road Ste 100 Sacramento, CA 95828	(916) 229-3000	mcleary@cdfa.ca.gov
Cook, Steven	NIST/OWM	Stop 2600 100 Bureau Drive Gaithersburg, MD 20878	(301) 975-4003	steven.cook@nist.gov
Cooper, Rodney	Actaris Neptune	1310 Emerald Road Greenwood, SC 29646	(864) 942-2226	rcooper@greenwood.actaris.com
DeMarco, Stephen	Dresser Wayne	3814 Jerrett Way Austin, TX 78728	(512) 388-8601	steve.demarco@wayne.com
Forkert, Maurice	Tuthill Transfer Systems	8825 Aviation Drive Ft. Wayne, IN 46809	(260) 747-7529	mforkert@tuthill.com
Frailer, Michael	Maryland Department of Agriculture	50 Harry S. Truman Parkway Annapolis, MD 21401	(410) 841-5790	michaelfrailer@comcast.net
Gallo, Mike	Clean Fuel Technologies	140 Market Street Georgetown, TX 78626	(512) 942-8304	mike.gallo@cleanfuelusa.com
Glowacki, Paul	Murray Equipment, Inc.	2515 Charleston Place Fort Wayne, IN 46808	(260) 484-0382	pglowacki@murrayequipment.com
Hoffman, David	Toptech Systems	280 Hunt Park Cove Longwood, FL 32750	(407) 332-1774	dhoffman@toptech.com
Johnson, Gordon	Marconi Commerce Systems Inc	7300 W. Friendly Avenue Greensboro, NC 27420	(336) 547-5375	gordon.johnson@gilbarco.com
Katalinic, Allen	North Carolina Dept of Agriculture	1050 Mail Service Center Raleigh, NC 27699-1050	(919) 733-3313	None available
Katselnik, Yefim	Dresser Wayne	3814 Jarrett Way Austin, TX 78728	(512) 388-8763	Phil.katselnik@wayne.com
Keilty, Mike	Endress & Hauser Flowtech AG	2350 Endress Place Greenwood, IN 46143	(317) 535-2745	michael.keilty@us.endress.com
Lachance, Christian	Measurement Canada	Stds Bldg #4 Tunney's Pasture Ottawa, Ontario, Canada K1AOC9	(613) 952-3528	lachance.christian@ic.gc.ca
Long, Douglas	RDM Industrial Electronics	850 Harmony Grove Road Nebo, NC 28761	(828) 652-8346	doug@wnclink.com
Miller, Richard	FMC Measurement Solutions	1602 Wagner Ave, Box 10428 Erie, PA 16514	(814) 898-5286	rich.miller@fmcti.com
Murnane, Robert	Seraphin Test Measure	P.O. Box 227 Rancocas, NJ 08073	(609) 267-0922	rmurnane@pemfab.com
Numrych, Charlene	Liquid Controls LLC	105 Albrecht Drive Lake Bluff, IL 60044	(847) 283-8330	cnumrych@idexcorp.com
Onwiler, Don	Nebraska Div of Weights & Meas	301 Centennial Mall South P.O. Box 94757 Lincoln, NE 68509	(402) 471-4292	donlo@agr.ne.gov
Parrish, Johnny	Brodie Meter Co., LLC	19267 Highway 301, North Statesboro, GA 30461	(912) 489-0203	Johnny.parrish@brodiemeter.com

Appendix A
2005 Measuring Sector Meeting Attendees

Name	Company/Agency	Address	Telephone #	E-Mail Address
Patoray, Steve	NTEP/NCWM	1239 Carolina Drive Tryon, NC 28782	(828) 859-6178	spatoray@mgmtsol.com
Rajala, David	Veder-Root Company	P.O. Box 1673 Altoona, PA 19906-1673	(814) 696-8125	drajala@veeder.com
Suiter, Richard C.	NIST/OWM	Stop 2600 100 Bureau Drive Gaithersburg, MD 20878	(301) 975-4406	rsuiter@nist.gov
Truex, James C.	Ohio Department of Agriculture	8995 E. Main Street Bldg. 5 Reynoldsburg, OH 43068-3399	(614) 728-6290	truex@mail.agri.state.oh.us
Wotthlie, Richard	State of Maryland	50 Harry S. Truman Parkway Annapolis, MD 21771	(410) 841-5790	wotthlrw@mda.state.md.us

Appendix C

National Type Evaluation Technical Committee
Weighing Sector Annual Meeting

September 25 - 27, 2005 – Columbus, Ohio
Meeting Summary

Carry-over Items

1. Recommended Changes to Publication 14 Based on Actions at the 2005 NCWM Annual Meeting

The NTEP technical advisor provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2005 Annual Meeting of the National Conference on Weights and Measures (NCWM). The Sector was asked to briefly discuss each item and provide general input on the technical aspects of the issues.

(a) Footnote to S.1.8.4.

Background: See the Report of the 90th NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 320-1 for additional background information. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 Scales Code paragraph footnote to S.1.8.4. Recorded Representations, Point-of-Sale Systems to nonretroactively prohibit the use of the "#" symbol.

Discussion: The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Section 76. List of Acceptable Abbreviations and Symbols and Electronic Cash Registers Interfaced with Scales (ECRS) Section 11 Recorded Representation Point-of-Sale Systems.

Recommendation: **The Sector recommends that amendments proposed in Appendix A-Agenda Item 1(a) be incorporated into NCWM Publication 14 DES Section 76. List of Acceptable Abbreviations and ECRS Section 11. Recorded Representation Point-of-Sale Systems.**

(b) Automatic Zero-Setting Mechanism (Zero-tracking)

Background: See the Report of the 90th NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 320-4 for additional background information. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 2.20. Scales Code paragraph S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism (AZSM), add new paragraphs S.2.1.3.1. Zero-Tracking for Scales Manufactured between January 1, 1981, and January 1, 2007, and S.2.1.3.2. Zero-Tracking for Scales Manufactured on or After January 1, 2007, and renumber paragraph S.2.1.3.3. Means to Disable Zero-Tracking on Class III L Devices.

Discussion: The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Section 43. The NIST Technical Advisor responded to a question on the AZSM requirements for Class III vehicle scales, Class III L scales, and Class IIII scales. The language that was adopted by the NCWM states that the AZSM limit for vehicle, axle-load, and railway track scales is 3.0 scale divisions for both Class III and III L Vehicle Scales. Wheel-load weighers must meet the same requirements as other scales in paragraph S.2.1.3.2. (b).

Recommendation: **The Sector recommends that amendments proposed in Appendix A-Agenda Item 1(b) be incorporated into NCWM Publication 14 DES Section 43. Automatic Zero-Setting Mechanism.**

(c) Table S.6.3.b. Note 3 – Nominal Capacity and Value

Background: See the Report of the 90th NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 320-5 for additional background information on the location and content for the marking of nominal capacity by division. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 2.20. Scales Code Table S.6.3.b. Note 3 – Nominal Capacity and Value.

Discussion: The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Sections 1 and 2, and Electronic Cash Registers Interfaced with Scales (ECRS) Sections 5 and 7.

The Sector requested clarification on what is meant by the phrase "readily apparent by the design of the device" in the previous editions of Handbook 44 Scales Code Table S.6.3.b. Note 3. They also reported that field officials, in both the United States and Canada, have repeatedly raised questions and suggested that pictures or diagrams be included in Publication 14 that demonstrate the meaning of the existing language. The Sector also suggested that examples of acceptable "capacity by value" markings and that the terms "Max," "min," and "e" be included in Publication 14 as examples of acceptable markings for "capacity by value."

Recommendation: **The Sector recommends that amendments in Appendix A-Agenda Item 1(c) be incorporated into NCWM Publication 14 DES with the three drawings from the Report of the 90th NCWM, S&T Committee Agenda Item 320-5 and an example using the international markings such as "Max", "e_{min}", and "d" be included in Publication 14[1]. Additionally, the Sector recommended that examples such as single revolution dials, beam scales[2] (excluding tip weights) be added to Publication 14 to demonstrate what is meant by the phrase "readily apparent by the design of the device."**

NIST Technical Advisor's Notes:

1. The Sector recommendation to amend the capacity markings sections of Publication 14 in **Appendix A-Agenda Item 1(c)** have been consolidated with the Sector recommend changes in Agenda Item 20. Permanence Tests for Identification Information.

2. WMD disagrees with the recommendation to exclude beam scales with tip weights from the capacity by division marking requirements. The example of a portable platform scale with supplemental weights should be required to be marked with a capacity by division statement since the sum of the supplemental weights are not readily apparent when viewing the reading face of the scale. Additionally, supplemental weights that are normally furnished with the scale may have been removed or additional weights may have been added which, according to the definition of "nominal capacity" in Handbook 44 Appendix D, would change its "nominal capacity". If supplemental weights are added in addition to the weights normally supplied with the scale, the scale would be overloaded beyond its intended capacity for both shift and increasing load tests. If weights were removed, shift tests would not be conducted with the appropriate amount of weight based on the intended scale capacity. Markings that included the nominal capacity would make the field inspector and user aware of the intended capacity of the scale for both use and test whether or not supplemental weights have been added to or removed from the scale.

During the discussion of this item the Sector noted that the use of "d" and "e" are used interchangeably in NIST Handbook 44. This can lead to the incorrect application of requirements applied to weighing devices where the scale division "d" is different than the verification division "e." Additionally, the terms graduation, interval, and division are not consistently used throughout the Scale Code. A small work group consisting of Darrell Flocken (Mettler Toledo), Gary Lameris (Hobart Corporation), the Ohio NTEP Lab, and Paul Lewis (Rice Lake Weighing) will review the entire Scales Code and develop a recommendation to amend Handbook 44 so that the abbreviations, terms, and definitions are used correctly and consistently in the code.

(d) Time Dependence (Creep Test) for Scales

Background: See the 2005 NCWM Publication 16 Committee Reports of the 90th National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-8 for additional background information. During its 2005 Annual Meeting, the NCWM agreed to amend NIST Handbook 44 Scales Code paragraph T.N.4.5. Time Dependence and add new paragraphs T.N.4.5.1. Time Dependence Class II, III, and IIII Non-automatic Weighing Instruments, and T.N.4.5.2. Time Dependence; Class III L Non-automatic Weighing Instruments.

Discussion: The Weighing Sector considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures Digital Electronic Scales (DES) Section 58. Time Dependence Test. Some members of the Sector requested clarification on the ambient test conditions and automatic zero-tracking information in the proposed test form. The NIST Technical Advisor reported that the ambient test conditions recorded on the test form are the same as the test forms used in OIML R 76-2. The information on the test form regarding the operational status of the AZSM was considered as optional information and is not on the

equivalent OIML test form and will be removed from the proposed test form. The Sector questioned the meaning of some of the symbols in the proposed test form and suggested that they be defined on the test form.

There were additional discussions that existing test procedures in Publication 14 requires that the creep test be performed at 20 °C, –10 °C, and 40 °C. OIML R 76 states that only one influences factor be tested at one time and that performing creep test at the various temperatures is considered as combining the influence factors of time and temperature. Members of the Sector believed that this subject should be submitted to Sector as a new agenda item, or be considered by the NCWM Specifications and Tolerance Committee.

Recommendation: **The Sector recommends that amendments in** Appendix A-Agenda Item 1(d)**, with changes to the test form recommended by the Sector, be incorporated into NCWM Publication 14.**

(e) Time Dependence (Creep Test) for Load Cells

Background: See the 2005 NCWM Publication 16 Committee Reports of the 90th National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-8 for additional background information regarding load cell creep test tolerances during type evaluation. During its 2005 Annual Meeting, the NCWM agreed to add NIST Handbook 44 Scales Code paragraph T.N.4.6. Time Dependence for Load Cells During Type Evaluation and Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation.

Discussion: The NIST Technical Advisor reported that NIST Weights and Measures Division (WMD) will be submitting a proposal to a regional weights and measures association S&T committee to add creep recovery test procedures that were inadvertently omitted from the proposal to add the Time Dependence requirements and lower the apportionment factors to better align NIST Handbook 44 with the 2005 Edition of NCWM Publication 14.

The Weighing Sector also considered a proposal from the NIST Technical Advisor to amend NCWM Publication 14 Weighing Devices Technical Policy, Checklists, Test Procedures for Force Transducers Section L. II Determination of Creep.

Recommendation: **The Sector recommends that the proposed language provided by the NIST Technical Advisor with editorial corrections to the language as recommended by the Sector in Appendix A-Agenda Item 1(e) be included in the 2006 Edition of NCWM Publication 14 Force Transducers (Load Cells).**

The NIST Technical Advisor has submitted a proposal to the Southern Weights and Measures Association S&T Committee that would correct the tolerances applied to Class III L load cells and add the creep recovery tolerances that were inadvertently omitted in the 2005 NCWM S&T Committee agenda item 320-8.

Pending action by the 91st NCWM Specification and Tolerances Committee in 2006 on this WMD proposal, the Sector recommends that no corresponding changes should be made to Table T.N.4.6. in the proposal to amend Publication 14 and that the creep test recovery procedures be deleted from the language submitted by the NIST Technical Advisor.

2. Identification: Built-for-Purpose Software-based Devices

Background: See the 2005 Report of the 90th National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda Item 320-1 in NCWM Publication 16 for additional background information and the proposed software identification language considered by the S&T Committee.

At the 2005 Annual Meeting of the NCWM, the S&T Committee heard no support for this item in its present form and agreed to withdraw the item from is agenda. The S&T Committee encouraged the regional Weights and Measures Associations, and associations of device manufacturers to develop and resubmit a new proposal if they think it is appropriate.

Additionally, the NCWM Board of Directors agreed to establish an NTETC Software Sector. That Sector will tentatively meet in April 2006. The charge of the Software Sector is to:

- Develop a clear understanding of the use of software for the operation of today's weighing and measuring instruments. This first step is important to permit the direction of the efforts mentioned in the next steps.
- Develop Handbook 44 specifications as needed to provide appropriate requirements for software incorporated into weighing and measuring devices and adequate tools for field verification and enforcement of such devices to include security requirements, simple identification means, etc.
- Revise existing or develop new Publication 14 checklists to provide NTEP laboratories the capability of identifying and certifying software or software components as being metrologically compliant with Handbook 44 requirements including, but not limited to its functions, marking, and security.
- Consider the development of guidelines for and promote training of weights and measures officials in proper application of Handbook 44 in verifying software as compliant and traceable to a NTEP Certificate of Conformance (CC).

Individuals interested in participating as members of the Software Sector were requested to contact Jim Truex, NTEP Committee Chairman.

Discussion: The Weighing Sector reviewed the background information and heard comments from Don Onwiler, NCWM Chairman, that the first meeting of the Software Sector will be held in conjunction with the 2006 meeting of the NTEP Participating Laboratories. The NTEP Committee has requested volunteers to participate in the Sector, including people who are experienced in developing metrological software. WMD recommended that the Software Sector consider soliciting input from foreign metrological regulatory agencies that have experience with regulating metrological software used in weighing and measuring devices and other U.S. Government Agencies that have experience in verifying the performance and security of software. Mettler Toledo reported that they have had some contact with the Western European Legal Metrology Cooperation (WELMEC) and experience with WELMEC Guide 2.3. Guide for Examining Software (Weighing Instruments). A copy of the WELMEC publication can be downloaded from their website at www.welmec.org/publications/2-3.pdf. The NTEP Director also suggested investigating the existence of software standards written by other U.S. standards writing organizations (e.g., ANSI) and that any volunteers to the Sector be willing to actively participating in the Sector and be committed to following through with assigned tasks.

Recommendation: **The NIST Technical Advisor included this item on the agenda only to provide the Weighing Sector with an update the status of the S&T Committee Agenda item 320-1 in NCWM Publication 16 Identification: Built-for-Purpose Software-based Devices and recommends no further action on this item since it was withdrawn from the S&T Committee agenda.**

3. S.1.1.c. Zero Indication (Marking Requirements)

Source: 2004 Weighing Sector Agenda Item 4 - S.1.1. (c). Zero Indication (Marking Requirements).

Background: See the 2005 Report of the 90th National Conference on Weights and Measures, Specifications and Tolerances Committee Report, the 2003 NTETC Weighing Sector Meeting Summary agenda item 19, and the 2005 NCWM Publication 16 S&T Committee Report Item 320-1 for additional background information on the proposal to clarify marking requirements for scales that display unloaded scale conditions with other than digital zero indications.

During the 2004 NCWM Interim Meeting, the S&T Committee was briefed on some ongoing discussions about zero indications within the Weighing Sector for the past several years. The Committee agreed that its interpretation of paragraph S.1.1. (c) is consistent with the original intent of the 78th NCWM Report of the Specifications and Tolerances Committee. The Committee agreed that additional language is needed to clarify that no marking is required if operator intervention is necessary to verify a zero condition before the start of a transaction. The Committee believed this will provide a record of how the requirement should be applied and proposed changes to paragraph S.1.1. (c) to clarify that no marking is required if operator intervention is necessary to verify a zero condition before the start of a transaction.

At the 2005 Annual Meeting of the NCWM, the S&T Committee changed the status of the item from "voting" to "information" to allow additional time to assess whether or not the markings could be displayed as part of the indication rather than being physically marked on the device and to gather more information on whether or not self-service systems are providing the necessary information about the zero-load condition of the scale prior to each weight determination.

Discussion: A couple of the scale manufacturers provided weighing instruments during the meeting and demonstrated how they operate with in the current requirements of S.1.1.(c). The purpose of the demonstration was to see the operation; have the opportunity to operate the scale; help other members of the Sector to understand the issue better; and show that the units have "an effective automatic means…" to satisfy the requirement without additional labels or markings.

NIST WMD restated that they continue to support the language recommended in the S&T Committee's agenda item 320-1 that clarifies the intent of the 78th NCWM S&T Committee. Furthermore, parties that disagree with the 2004 Committee's interpretation and oppose the proposed language in 320-1 should develop an alternate proposal to clarify that additional markings ***are not required*** for devices that have "an effective automatic means" to inhibit a weighing operation or return the device to a continuous digital indication when the scale is in an out-of-balance condition.

Mettler Toledo stated that they continue to oppose the proposed language to amend Scales Code paragraph S.1.1. (c). since effective means are provided to inhibit a weighing operation when zero indications are indicated by other than a digital zero when the scale is in an out-of-balance condition. That is, the scale will not go into a "sleep" mode if there scale is not at zero and will return to an active weight display if the scale senses that the scale is no longer at zero. In situations where the scale display turns off with the scale in an out-of-balance condition, operator intervention is required to turn on the scale, in which case the scale will automatically be rezeroed or indicate an error condition.

Mettler Toledo further stated that their position is based on the language in NIST Handbook 44. WMD responded that the proposal is intended to clearly state the position of the 78th NCWM S&T Committee in NIST Handbook 44.

Other manufacturers supported the Mettler Toledo position and discussed other methods that provide effective means to inhibit weighing transactions and display other than digital zero indications such as center-of-zero annunciators, RFID (radio frequency identification device) would reactivate the scale displays when the product is in close proximity to the scale, touch screen display scale activation that would automatically activate when the scale was in an out-of-balance condition, weight displays visible to the operator when the customer display indicates promotions or other non weight information.

The Maryland NTEP laboratory and NIST WMD stated that the proposed language represents what is already covered by NTEP evaluation and test criteria. The problem is that field officials do not know if or when additional markings are required, and that customers need the zero information (either by a digital zero or other indication that the scale is at zero) along with the weight, and pricing information in a computing type device, in order to make an informed decision on whether or not to accept the weight (and total price) determination.

The Ohio NTEP laboratory disagreed with the WMD and Maryland positions and reported that they have not heard of any problems by field officials and that they have received no customer complaints on this subject.

Additional comments were made that supported the Ohio position and that customers do not look at the zero condition of the scale and that they are only concerned about the price they have to pay. WMD and Maryland responded that the Sector should not be making that assumption and that there are customers that want to make sure that the scale starts at zero in order to receive an accurate transaction.

Recommendation: **The discussion was concluded since there was no clear consensus on a position that the Sector could report to the NCWM S&T Committee on the agenda item. The Sector Chairman held two votes on this subject. The results of the vote will be forwarded to the NCWM S&T Committee.**

The first vote was to determine if the Sector agreed with the proposal on the NCWM S&T agenda to amend Handbook 44 paragraph S.1.1. (c) to clarify that additional markings *are required* for devices that have an effective automatic means to inhibit a weighing operation or return the device to a continuous digital indication when the scale is in an out-of-balance condition. Two Sector members voted to support the S&T Committee proposal and eleven Sector members voted against supporting the proposal.

The second vote was to establish a Sector position that states that additional markings *should not be not required during type evaluation* on devices that have an effective automatic means to inhibit a weighing operation, or return

the device to a continuous digital indication when the scale is in an out-of-balance condition. The results of the second vote: two Sector members voted to oppose this position and twelve Sector members voted to support this position.

The result of the second vote means that such markings would not be required during type evaluation. It should be noted that WMD continues to believe that field officials may require such markings citing General Code paragraph G-S.6. Marking Operational Controls, Indications, and Features and the interpretation of the 78th NCWM S&T Committee unless Scales Code paragraph S.1.1. (c). is amended to clearly state that no additional markings are required when a device, where zero is indicated by other than a continuous digital zero, has effective means to inhibit a weighing transaction when the scale is in an out-of-balance condition.

4. Bench/Counter Scale Shift Test and Definitions

Source: NIST WMD

Background: See the 2004 NTETC Weighing Sector Meeting Summary agenda item 5 and the 2005 NCWM Publication 16 S&T Committee Report agenda item 320-6 for additional background information.

At the 2005 Annual Meeting of the NCWM, the S&T Committee agreed with the Scale Manufacturers Association to modify Figure 2, test positions for test loads located in the corners of the scale platform but kept the proposal as an information item to enable weights and measures officials and the NTEP Laboratories to continue forwarding data on the proposed and current shift test to the NIST Technical Advisor.

Discussion/Recommendation: **WMD has received limited data from one state and no data from the NTEP laboratories. WMD requests that any data from the participating NTEP laboratories be submitted by November 1, 2005, in order that the results can be compiled and presented to the S&T Committee during the January 2006 NCWM Interim Meeting.**

Jim Truex, Chief Ohio Department of Agriculture Weights and Measures, reported that their field officials and the Ohio NTEP laboratory have collected data, and the data will be submitted to WMD by November 1, 2005. Jim added that preliminary results indicate that they have not found any significant problems.

There is no action required by the Sector at this time.

5. Publication 14 Force Transducer (Load Cell) Family and Selection Criteria

Source: NTEP Committee Technical Advisor

Background: See the 2004 NTETC Weighing Sector Meeting Summary agenda item 11 for additional background information regarding a recommendation to amend the family selection criteria for load cells to be listed on an NTEP Certificate of Conformance.

During its 2004 Meeting, the Weighing Sector agreed to assign a work group (Stephen Patoray (NTEP), Steven Cook (NIST), the NIST Force Group, Joseph Antkowiak (Flintec), Frank Rusk (Coti), and the California NTEP laboratory) to complete the following tasks:

1. Develop the definition of a family, determine load cell selection criteria, and develop an example of a load cell selection for the 2005 NCWM Interim Meeting.
2. Review and adapt OIML R 60 language developed by John Elengo for incorporation into Publication 14 for the 2005 meeting of the Weighing Sector.

Discussion: Stephen Patoray, NTEP Director, updated the Sector on the status of the project. He described a proposal that has been forwarded to the small work group. In summary, the proposal has the potential for an applicant to submit only one load cell for a basic load cell family to be covered on an NTEP CC. However, taking into consideration possible groups within the family (e.g., material construction, methods of mounting, strain gauge bonding, output rating,

input impedance, supply voltage, cable details, etc.), there will be no significant difference in the number of load cells that have to be submitted for evaluation.

One of the questions that must be addressed in any proposed change to the selection criteria is how the criteria will affect applications to amend and expand existing CC.

Recommendation: **The Sector agreed that no actions are required by the Sector at this time since the work group has not finalized a specific proposal to modify load cell selection criteria.**

6. Compatibility of Indicators Interfaced with Weighing and Measuring Elements

Source: NTETC Measuring Sector and NCWM S&T Committee

Background: This issue proposed to change what requirements and evaluation criteria must be met to interface an indicating element and a weighing or measuring element that have not been previously evaluated together on a single NTEP CC, but which have their own NTEP CC listing compatible communication specifications. See the 2004 Report of the 89th NCWM, Specifications and Tolerances (S&T) Committee Agenda Item 310-2 and the 2004 NTETC Weighing Sector Meeting Summary Agenda Item 12 for additional background information.

At its 2004 meeting, the Weighing Sector stated that the proposal as written is not appropriate for weighing devices since the language could require all combinations of devices and communications to be evaluated. The Weighing Sector agrees with the Measuring Sector that this is not the intent of the proposed language. The NCWM S&T Committee decided to withdraw Item 310-2 from the S&T Committee Agenda until it is further developed and resubmitted with the support of the NTETC Weighing and Measuring Sectors.

The Sector supported a joint meeting of the NTETC Weighing and Measuring Sector members attending the 2004 Southern Weights and Measures Technical Conference (SWMA). The Weighing Sector agreed that, if both the Weighing and the Measuring Sectors could agree on the issues and proposal, then the proposed language could be proposed to the NCWM S&T Committee for placement in the General Code; otherwise, any proposed language should be proposed for inclusion in the specific codes. If there were no agreement between the Weighing and Measuring Sectors, the Measuring Sector could request a separate work group to develop a proposal to address the compatibility of multiple elements issue for the NIST Handbook 44 Liquid-Measuring Devices Codes.

At its 2004 meeting, the Measuring Sector generally agreed that the language added to Publication 14 in a new Section T. Testing Required To Interface Components With Individual CC's That Were Not Previously Tested Together was sufficient to address the original concerns of manufacturers regarding when additional testing is necessary to determine compatibility between components. The Measuring Sector did not propose any new language for Handbook 44 to be submitted to the NCWM S&T Committee for consideration. The Sector agreed that the item should be dropped from the Measuring Sector's Agenda. As a result of the Measuring Sector's conclusion, for a joint discussion between the Weighing and Measuring Sectors to develop a proposal to address the compatibility of multiple elements was no longer necessary.

Discussion/Recommendation: **The NIST Technical advisor has received no additional input on this item and recommended that it be withdrawn from the Weighing Sector's agenda until a proposal has been developed to address the apportionment of errors for separable weighing, load-receiving, and indicating elements. The proposal should also include testing and reporting the minimum sensitivity of indicating elements (i.e., smallest voltage per scale division). It should also be noted that the proposed revision of OIML R 76 for Non-automatic Weighing Instruments includes recommendations for the apportionment of errors and a proposed Annex E for checking the compatibility of modules of non-automatic weighing instruments. The OIML definition for the term "module" is nearly identical to the Handbook 44 definition of "element".**

The Weighing Sector agreed that the compatibility of weighing modules is not clearly defined in NIST Handbook 44 and NCWM Publication 14 evaluation and test criteria for digital electronic scales and that any proposal to define such criteria would be a major project.

The Sector recommends no further action on this item and that it be removed from future agendas unless a specific proposal to establish criteria for determining the compatibility of weighing, indicating, and other elements has been developed.

7. Handbook 44 Computing Scales Interfaced with an Electronic Cash Register

Background: See the 2005 Reports for the 90th National Conference on Weights and Measures, Specifications and Tolerances Committee Agenda item 320-3 and the 2004 NTETC Weighing Sector Meeting Summary agenda item 13 for additional background information on a proposal to amend NIST Handbook 44 that would list specific requirements for electronic cash registers that are interfaced with scales.

At its 2004 meeting, the Weighing Sector agreed not to recommend a proposal to NIST Handbook 44 to add new device-specific code requirements to the Scales Code to address the proper interface of computing scales with electronic cash registers (ECR). The Sector generally agreed that there are currently appropriate means in Handbook 44, including General Code paragraphs G-S.5. Indicating and Recording Elements and G-S.2. Facilitation of Fraud, and the examination procedure outlines to address the proper interface of computing scales with ECRs during field evaluation.

At the 2005 NCWM Annual Meeting, the S&T Committee expressed concerns that the proposal is not fully developed for multiple reasons.

- Manufacturers indicate the proposed subparagraphs are too restrictive when a point-of-sale system reads UPC codes and recomputes prices for frequent shopper discounted prices.
- The Committee heard comments that NTEP verifies the requirement in the proposed new paragraph (d) to ensure that the electronic cash register does not have any input to the computing scale in the process of determining the total price of a weighed item. However, the Committee believes that the term "input" should be expanded to clarify the requirement for field officials.
- The proposal does not address computing scales with multiple sales accumulation capability.
- Further work is also required to make certain that an examination procedure outline is available to provide field procedures for use in determining that the interface complies with the requirement.
- The current definition of point-of-sale system (POS) may also require some modification to clarify the specific type of weighing element that is permitted as part of the POS assembly.

The Committee also heard that there are instances in which a computing scale may be inappropriately interfaced with an ECR to create a point-of-sale system contrary to the intended device application covered on the device's CC. The Committee believes this becomes a design issue rather than one involving the user; however, a user requirement might also be appropriate. Because of these questions and unresolved issues, the Committee changed the item status from "voting" to "information" and recommends the original submitter rework the proposal as a specification that (1) provides more detail to the field official about how the cash register must function, and (2) is readily available in NIST Handbook 44 to assist device manufacturers who are considering design modifications to a computing scale or cash register. The Committee also asked the SWMA to determine if a user requirement is needed as a companion paragraph to a device specification, and review any proposed language to ensure there are no conflicts with requirements in related paragraphs such as S.1.8.4. Recorded Representations, Point-of-Sale Systems.

Discussion: The NIST technical advisor recommended no action on this item pending further action and work by the original submitter. It was reported the Western Weights and Measures Association at their 2005 Technical Conference recommended that this item be withdrawn from the NCWM S&T Committee agenda. The Central Weights and Measures Association (CWMA) also reported that there were no comments on this item and that they did not provide the S&T Committee with a recommendation during the 2005 CWMA Technical Conference Interim Meeting.

The Maryland NTEP laboratory stated that weights and measures officials are not uniformly applying existing requirements since it is easy to miss language that is located in multiple places in Handbook 44 and that the proposal to amend NIST Handbook 44 is being modified.

Recommendation: **The Sector recommends no action on this item and that it not is placed on the 2006 Sector agenda as a carryover item.**

8. Publication 14 - New Items in Computing Scale Section

Source: Maryland Participating Laboratory

Background: See the 2004 NTETC Weighing Sector Meeting Summary agenda item 16 for additional background information regarding the display of product code information in the total price display on a computing scale.

The Maryland NTEP laboratory reported on a computing scale (see picture below) that used the "Total Price" display to indicate the product code prior to a load being placed on the scale and a calculation of total price. They reported that the product code (PLU) is indicated by illuminating all "□" segments and turning off the decimal point in the "Total Price" portion of the display. This PLU indication in this example may cause a customer to believe that the PLU number is the total price to pay if a load was already on the platform and the product code was entered.

Many of the sector members did not believe the above example provided by the Maryland laboratory was a problem since the product code did not use a decimal point similar to a representation of money.

The 2004 Weighing Sector concluded that the example provided by the Maryland NTEP laboratory did not demonstrate that there is a problem and that the proposed language may cause additional confusion. The Maryland NTEP Lab was requested to further develop the language and submit such to the Sector for discussion and ballot approval.

Discussion: The Maryland NTEP laboratory updated the Sector on the status of their proposal. The NTEP laboratories and manufacturers stated that any language proposed for NIST Handbook 44 and/or NCWM Publication 14 should address the following:

- Price computing scales with Weight, Unit Price, and Total Price information displayed from top to bottom,
- Total Price information should be located on the right for horizontal layouts,
- New products are likely to have panel type liquid crystal or matrix displays that can be configured in multiple or customer designed formats,
- Once the Unit Price is displayed on the scale, the PLU should be replaced by the Total Price (the example above example indicated both a Unit Price with the PLU number in the Total Price position),
- Weight and pricing information, regardless of the order it is presented should be adequately identified and easily read, and
- Product code or other information should not interfere with the weight display

Some of the manufacturers noted that transactions frequently happen too fast for a customer to understand what is happening during the weighing and pricing procedures and only pay attention to the Total Price. The NIST technical advisor responded that the Sector should not be making that assumption that all customers do not look at or care about the net weight and unit price information.

A few of the Sector members noted that the example shown above could be confusing to the customer if the PLU number has three of more digits. Other Sector members replied that the leading digital zeros in the above example are not permitted to be part of the "Total Price" to pay. The NTEP Director questioned whether this prohibition is in Publication 14 or Handbook 44.

Recommendation: **There was no consensus on a recommendation for this item among the voting and non voting members of the Sector. The Sector Chairman took a vote of the voting members to determine if the Sector believed there was a problem with the language on the format of the displays on price computing scales in NCWM Publication 14. The Sector voted 15 (agreed) to 1 (disagree) that no language is needed to address the format of price computing scale displays.**

Gary Lameris volunteered to review NIST Handbook 44 Scales Code and NCWM Publication 14 to determine if language is needed to address "other than weight information" that may be indicated in the weight display. Any recommendations will be forwarded to the participating laboratories at their 2006 spring meeting and to the 2006 NTETC Weighing Sector Meeting.

9. CLC Type Evaluation Tests on Railway Track/Vehicle Scales – Technical Policy

Source: Brechbuhler Scales Inc.

Background: At its 2004 meeting, the Weighing Sector could not reach a consensus on the request that vehicle weighing applications (e = 20 lb) be added to existing railway track scale CCs (e = 50 lb) that have been designed to Cooper E-80 standards and tested using the GISPA test car (or other railroad test cars and additional test weights).

Brechbuhler Scales stated that they would develop and submit a proposal for testing for railroad track scales that would include procedures to include highway vehicle applications with d = 20 lb on CC for railway track scales that were evaluated with d = 50 lb without additional testing for consideration at the 2005 meeting of the Weighing Sector.

Publication 14 Technical Policy Section 8 paragraph "c." states that a CC will apply to all models that have scale division values equal to or greater than the value of the scale division used in the scale that was evaluated. Brechbuhler Scales recommends that the technical policy in 8.c. should not apply to combination railway track/vehicle scales that already have an active CC for weighing railway track cars. That is, the CC for a railway track scale with d = 50 lb can include vehicle-weighing weighing application with d = 20 lb without additional testing provided that the GISPA test car, or suitable field standard weight carts are used for the evaluation of the railway track scale. The recommendation for amending the technical policy for modular combination railway track/vehicle scales is included in the 2nd recommendation to Agenda Item 14, CLC for Combination Railway Track/Vehicle Scales.

Discussion: The NTEP Director requested clarification on whether this agenda item is intended to address the issue of what is required to be tested for new device types or if the issue is to address what can be covered on existing certificates. If a device is tested with d = 50 lb, the certificate cannot cover scales with d = 20 lb without additional testing. Additionally, the performance and permanence tests for vehicles are different than the performance and permanence test for railway track scales. A railway track scale permanence test does not meet the requirements of the vehicle scale permanence test. The NIST technical advisor stated that the subject of agenda item 11 is intended to draft language for the permanence and performance testing the style that has been drafted for vehicle scales and other large capacity scales. There will be remaining differences in the number of test loads for the increasing/decreasing load tests and the amount of test weights and test loads needed for each test.

Brechbuhler Scales stated that it would be best to test the scale with a multiple range indicating element where d = 20 lb in the weighing range of typical vehicle weights and with d = 50 lb in the weighing range for railway cars.

Many of the NTEP laboratories remain concerned that vehicles on combination railway track/vehicle scale applications do not roll on to the scale in the same path as railroad cars since vehicles can drive on either the right or left side of the railroad car traffic pattern. Compliance with loading along the sides of the scale that simulates vehicle traffic (wandering loads from side to side) should be verified during an NTEP evaluation. Additionally, testing at weights in the vehicle

weighing range and railway car weighing range should also be performed at the same time since span calibrations at the lower weighing range does not guarantee accuracy at the higher range, or vice versa.

The NTEP Director stated that there is no well-defined test procedure or technical policies in NCWM Publication 14 for combination railway track/vehicle scale NTEP evaluations and recommends that such language be developed. The Ohio NTEP laboratory supports such a project. Other comments included that the procedures should include discussions about Cooper E 80 design requirements.

Another NTEP laboratory cautioned that some of the Cooper E 80 requirements are not suitable for NTEP evaluation and subsequent verification by field officials such as approaches to railway track scales. NTEP evaluations should be limited verifying the compliance with the metrological and installation requirements in NIST Handbook 44. A manufacturer also recommended that the NTEP application form include a space for an applicant to request the vehicle weighing option on the railway track scale application.

***Recommendation*: The Sector agreed that NCWM Publication 14 Technical Policies and Test Criteria for vehicle scales and railway scales should be reviewed and that separate test criteria should be developed for combination vehicle/railway track scales. The new criteria should include technical policies and test procedures for:**

1) **New NTEP applications,**
2) **Amendments to existing CCs for railway track scales to include the vehicle weighing feature including;**
    a. **CLC ratings,**
    b. **CLC testing using field standard weight (center vs. off-center),**
    c. **Permanence tests for amending railway track CCs to include vehicle weighing option, and**
3) **Test using the vehicle scale e_{min} for new NTEP applications and existing CCs.**

Ed Luthy agreed to develop a draft proposal and distribute it for review and comment to Stephan Langford, Darrell Flocken, and Bob Feezor. Develop procedures and technical policies are due to the NIST Technical Advisor by March 1, 2006, in order that the proposal can be reviewed by the NTEP laboratories prior to it being submitted to the NTETC Weighing Sector for their September 2006 meeting.

10. Tare on Multiple Range Scales

Source: NTEP Participating Laboratories:

Background: See the 2004 NTETC Weighing Sector Meeting Summary agenda item 22 for additional background information on the discussion for the rounding of tare on single and multiple range, and multi-interval scales.

The NIST Technical Advisor requested clarification on the rounding of tare on multiple range scales from the Secretariat to OIML R 76 as part of the U.S. comments to the Working Draft (WD) revision of R 76. The Secretariat responded by including several examples of tare rounding for single and multiple range scales with both tare weighing (pushbutton tare) and preset tare (keyboard tare) in the 1st Committee Draft (1 CD) revision. To summarize the exampled, tare must be round to the nearest division of the higher weighing range when the gross weight goes to the higher weighing range. However, the Secretariat did not include examples where the tare would round to zero when the gross weight entered a higher range. The United States followed up on this question in their comments on the 1 CD in April 2005. The Secretariat will address this question in the 2nd Committee Draft (2 CD), which will be distributed in October 2005.

The Sector was requested to:

(1) Discuss the rounding up of tare for multiple range and multi-interval scales in NCWM Publication 14 section 31 and 32. The rounding up of tare conflicts with NIST Handbook 44 General Code paragraph G-S.5.2.2. (c), which requires that digital values round off to the nearest minimum unit that can be indicated or recorded, and Publication 14 section 48.2.2., which requires that keyboard tare weight entries be rounded to the nearest displayed scale division.

(2) Review the of examples of tare rounding from the 1 CD of the revision to OIML R 76 for possible inclusion into Publication 14 once the revision to R 76 has been completed.

Discussion: The Sector reviewed the examples or tare rounding from the 1st Draft Revision of OIML R 76. The examples indicated that in the examples where tare was determined by actual weighing, tare and gross weights could be taken to the internal resolution of the scale and that the rounding after the net weight was calculated from the internal resolution of the gross and tare weights and that printed tare values could be off by 1 e. Other examples showed that the net weight, calculated as the difference between gross and tare weights) could have a least significant digit that was not the same as the weighing range of the net weight.

The Sector also reviewed the NCWM Publication 14 paragraphs that discuss the rounding of tare. There were several points made on the rounding of tare including:

- Always rounding tare in the upward direction always benefits the customer to the detriment of the scale seller.
- Tare rounding procedures should be clear and well documented in NIST Handbook 44 and NCWM Publication 14 for consistent type evaluations and field enforcement activities.
- Past Sector discussions concluded that tare would round up to facilitate compliance with NIST Handbook 130 Model Uniform Weights and Measures Law Section 15. Misrepresentation of Quantity which states that, "no person shall sell, offer, or expose for sale a quantity less than the quantity represented..."
- A proposal has been submitted to the 2005 Southern Weights and Measures Association Specifications and Tolerance Committee to require that tare always rounds up. It is intended for the seller to include the cost of the packaging in the price of the product as opposed to paying the same unit price for the package as the product.
- Some states disagree that rounding to the nearest scale division is in violation with Uniform Weights and Measures Law
- NCWM Publication 14 tare rounding requirements for multi-interval and multiple range scales is in conflict with NIST Handbook 44 General Code paragraph G-S.5.2.2. (c).
- Handbook 44 does not support the Publication 14 requirement that zero tare entries are not permitted.
- Rounding tare to zero when the gross weight goes to the next segment or range in multi-interval or multiple range scales should not be allowed.
- Why does Publication 14 specify different methods for rounding tare between single range and multi-interval, multiple range scales?

Recommendation: **The Sector voted 13 to 4 to modify Publication 14 to make tare rounding consistent with Handbook 44 General Code paragraph G-S.5.2.2.(c) Digital Indication and Representation for multi-interval and multiple range scales. The NIST Technical Advisor will work on develop amendments to Publication 14 sections 31, 32, and 45-51 for Tare and other possible sections that will consistently apply the rounding of tare throughout the digital electronic scales checklist. The Sector will then be balloted on the proposed modifications to Tare in Publication 14.**

The Sector also agreed to consider the OIML R 76 examples of tare rounding at a later date once the revision of the R 76 has been completed.

NIST Technical Advisor Note: During the development of the letter ballot language, it was noted that there were some items (e.g., tare annunciators and terminology) that requires further discussion by the Sector. Additionally, there is a developing (D) item in the 2006 NCWM S&T Interim Agenda that may have an impact on the Sector recommendation. An alternate proposal was also developed that would address the operation of the "tare entered" annunciators, examples demonstrating tare rounding in different scenarios, and add definitions clarifying the differences between semi-automatic tare and preset tare. Based on these concerns, the NIST Technical Advisor does not believe that the language to amend Publication 14 is sufficiently developed to be submitted to the Sector as a letter ballot.

The NIST Technical Advisor consulted with the NCWM Chairman, NTEP Committee Chairman, Sector Chairman, and NCWM Technical Advisor on both proposals to amend Publication 14 tare requirements. As a result, it is recommended that a small work group review the proposals, review tare operation and requirements in general, and make recommendations on how this is applied to single range, multiple range and multi-interval scale operation. The work group should develop a recommendation(s) for changes to Handbook 44 and Handbook 130 (if necessary), and provide the Weighing Sector guidance on checklist requirements. It is anticipated that the group could perform the tasks though the use of e-mail correspondences and conference calls.

11. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically

Source: NTEP Participating Laboratories

Background: See the 2004 NTETC Weighing Sector Meeting Summary agenda item 23 for additional background information on performance test criteria, permanence test requirements, and application of tolerances for railway track scales. At the 2004 meeting of the Weighing Sector, the NIST technical advisor and Ed Luthy (Brechbuhler Scales) volunteered to submit this issue at the October 2004 meeting of American Railway Engineering and Maintenance of Way Association (AREMA) Committee 34-Scales.

AREMA Committee 34 responded with the following statements to comments and questions from the summary of the 2004 meeting of the Weighing Sector.

1. The railroads agree that, when conducting NTEP testing of railroad scales, acceptance tolerances must be applied regardless of the interval between the initial test and the permanence test.
2. The railroads do not agree that there is a poor "As Found" compliance rate *when railroad track scales are designed and installed per the requirements of the AAR Scale Handbook.*
3. NCWM Publication 14 (DES-109 68.7 Permanence Test) allows the permanence test to be conducted with alternative test weights, such as railroad scale test cars. With sufficient coordination between GIPSA and the railroad upon which the scale is located, delays should be minimal and controllable.
4. The railroads do not agree with removing permanence testing from the NTEP test. This is an important part of the NTEP process.

GISPA has also provided some additional comments regarding permanence testing on railroad track scale NTEP evaluations. GISPA recommended that new installations should be set up and calibrated using a railroad test car after GIPSA inspects the installation for compliance with railroad bridge specifications; and then the scale should be subjected to a "break-in" period of a month or two. GIPSA would then come in and perform the initial NTEP test. GIPSA would come back as soon as possible, but no sooner than 20 or 30 days following the initial NTEP test and do the final test for permanence; the scale would be held to acceptance tolerances. If GIPSA can't get back for some reason, a single 100 000 lb (minimum) railroad scale test car or two 80 000 lb cars with current NIST traceable calibrations can be used for the permanence test.

Discussion: The Sector reviewed a proposal to amend the 2005 Edition of Publication 14, Section 69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically submitted by the NIST technical advisor based upon the comments of the 2004 Weighing Sector, GIPSA, and AREMA Committee-34.

The Sector also reviewed additional comments dated September 23, 2005, from Ron Mueller, stating that the Canadian National Railway does not agree with GIPSA's recommendations concerning Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically and that NTEP should initially approve all new types of devices. The reasons for the Canadian National Railway's position are that many railroads will not be willing to oversee installation or evaluate railway track scale design and that the length of minimum and maximum time for the recommended break-in period prior to the start of the official NTEP testing is too subjective and not adequately defined. Ron Mueller also stated that the task of type approving a weighing device is, and should remain, that of NIST, NTEP, and GIPSA combined.

Ron Mueller stated that NIST, NTEP, and GIPSA have relied on the servicing railroads to do engineering tasks assigned for their approval procedures and suggested that an independent organization with the expertise and desire to inspect and evaluate these design criteria be allowed to perform this task (e.g., Mr. Ronald W. Kaye, Senior Transportation Engineer, Patric Engineering, Joliet, Illinois at (630) 795-7265). The cost for such design and engineering approval could become part of the NTEP process. He further added that no consideration should be given to performing a type approval of a railway track scale at a manufacturer's site."

Robert Feezor, Northfolk Southern Corporation, amended the language submitted by the NIST Technical Advisor based on comments from the Canadian National Railway and submitted it for review by the Sector. The Sector reviewed the proposal as amended by Bob Feezor and discussed the possible use of 80 000 lb field standard weight carts where and additional 20 000 lb could safely be added to the weight carts for the tests. Additionally, the Sector discussed the permanence test language that permitted one or more railroad test cars to be used for the permanence test in lieu of the GIPSA type weight cart. The railroads believe that the length of suitable railroad test cars precludes using two cars on a single scale and that it is unlikely that two railroad test cars would be available for the tests. Other Sector members believed that it would be acceptable to use any combination of field standards, field standard weight carts, and railroad test cars to perform the permanence test.

***Recommendation*: The Sector agreed to amend the language developed by the NIST technical advisor as recommended by Bob Feezor with additional changes recommended by the Sector. The modified proposal with Sector comments were forwarded to AREMA Committee-34 for their October 24 - 24, 2005, meeting. The modified proposed language and comments from AREMA Committee-34 were then be forwarded to the Sector for a vote on the final language that will be recommended for incorporation into the 2006 Edition of Publication 14.**

Technical Advisor's Note: The following is a summary of AREMA Committee-34 suggestions from their October 2005 meeting to modify to the Sector's recommendation.

Delete the language that allows permanence testing at the applicant's manufacturing site.

- Justification: It is unlikely that the applicant's manufacturing facility will have a suitable on-site location and loads at their site. The railroads are concerned that a manufacturer's site may not represent typical customer installations where the scale design and various aspects of the installation are evaluated and approved by the serving railroad prior to the railroads accepting weights from the scale. Additionally, the loads may not represent actual usage when railcars are not used for the weighing operations.

Change the minimum number of weighing operations from 300 to 150.

- Justification: Unlike in-motion scales, some static railway track scale installations may only have 3 to 5 weighing operations per day. At that rate, it could easily take a year or longer between tests. Even with the minimum 150 weighing operations recommended by the railroads it would take 30 to 50 days to complete the minimum number of weighing operations. The railroads added that it could cost at least $6000 or more to perform additional weighing operations that were not part of an installations normal operation.

Change the minimum time to conduct the permanence test after the initial test from 20 days to 30 days. Note that this does not agree with the Sector recommendation.

- Justification: The railroads believe that 20 days is too short a time between that initial and subsequent test for permanence even at a high volume test site. Adding the extra time provides the railroads with additional assurance that the scale can perform within tolerance between normal subsequent tests.

Technical Advisor's Note: The proposed language and comments from AREMA Committee-34 were then forwarded

to the Sector for a vote on the final language that will be recommended for incorporation into the 2006 Edition of Publication 14.

The following information is a summary of the voting results during the balloting process. A copy of this summary, comments on the ballot language, and the amended proposed language were forwarded to the NCWM NTEP Committee for their consideration during the January 22 - 25, 2006, NCWM Interim Meeting in Jacksonville, Florida.

ITEM NO.	SUB. NO.	ITEM	AFFIRM	NEGAT.	ABST.
1		Approve the 2005 Weighing Sector recommendations to amend NCWM Publication 14 Section 69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically.	7 *(3 private 4 public)*	1 *(public)*	3 *(2 private 1 public)*
2		Approve the following additional modifications recommended by the American Association of Railroads AREMA Committee-34.			
	a.	Delete the language that allows permanence testing at the applicant's manufacturing site.	4 *(1 private 3 public)*	3 *(2 private 1 public)*	4 *(3 private 1 public)*
	b.	Change the minimum the number of weighing operations from 300 to 150.	3 *(private)*	3 *(public)*	5 *(3 private 2 public)*
	c.	Change minimum time to conduct the permanence test after the initial test from 20 days to 30 days.	4 *(3 private 1 public)*	2 *(public)*	5 *(3 private 2 public)*

Based upon the ballot results and comments received during the balloting process, the language in* Appendix A-Agenda Item 11 *was amended to delete the language that allows permanence testing at the applicant's manufacturing site, to change the minimum time to conduct the permanence test from 20 days to 30 days, and clarify that 100 000 lb of field standard test weights and/or field standard weight carts are required for the initial test of a railway track scale. Additionally, language is added to clarify that a railroad test car(s) may be used in lieu of, or in conjunction with field standard test weights and/or field standard weight during the permanence test.

Additional editorial suggestions are proposed to clarify the documentation required to verify certification of field standards and railway track scale test cars, and clarify term "standard rail car" since the railroads use this term to describe a type of railway scale test equipment.

12. Cash Acceptors or Card-activated Systems

Source: NTEP Participating Laboratories

Background: At its 2004 meeting, the Weighing Sector recommended cash acceptor checklist language. After the meeting, a device incorporating cash acceptors was submitted for evaluation. During the evaluation, it became evident to the NTEP laboratory evaluator that some items in the recommended checklist were either vague or missing from the proposed Publication 14 language. The items identified by the laboratory were:

(1) insufficient paper to print a receipt and complete a transaction, and
(2) insufficient funds to return the correct change or return the correct amount inserted into the machine should a transaction be canceled.

Additional language was proposed by WMD and reviewed by the NTEP Director and the NTEP laboratory that was conducting the evaluation. The *ad hoc* language attempts to ensure that customers receive printed or displayed

instructions directing them to contact a store attendant or manager to retrieve correct change or a copy of the transaction information printed on a separate recording element in case of insufficient funds or receipt paper.

During the 2005 NCWM Interim Meeting, the NTEP Committee agreed to add the additional language as *ad hoc* language in the 2005 update of NCWM Publication 14 (below). The NTEP Committee discussed several additional "cash acceptor" issues that may require clarification or additional checklist requirements. The NTEP Committee also requested that this item be presented during the 2005 meeting of the Weighing Sector to address these issues and noted that these items may also need to be addressed in other sections of NCWM Publication 14.

The NTEP Committee asked the Weighing Sector to:

1. Review the procedures and ad hoc language in the agenda for addition to Publication 14 Electronic Cash Registers Interfaced with Scales Section 13.
2. Discuss the need for a definition of card-activated and/or cash acceptor systems. Some of the questions that need to be answered include:
    a) Are they limited to ECR/POS interfaced with scales?
    b) Are they self-service customer card-activated/cash acceptor systems and does the checklist apply to store clerk card-activated/cash acceptor systems?
3. Discuss other possible scenarios involving cash acceptors and card activated systems that may affect the accuracy of the transaction, including issues such as the ability for the customer to receive sufficient information to make informed decisions about their transaction, and to receive correct change, credits, discounts, and suitable receipts.

The NTEP Participating Laboratories for Weighing Devices reviewed the *ad hoc* language, explored the possibilities of additional cash acceptor problems, and developed Publication 14 language to be recommended to the Weighing Sector. This information has been forwarded to the NTEP Liquid-Measuring Devices (LMD) Participating Laboratories and NTETC Measuring Sector for their review for potential amendments to the Publication 14 LMD Checklist.

Discussion: The Weighing Sector reviewed the *ad hoc* modifications to the checklist. It was acknowledged by the Weighing Sector that there are differences between cash and card acceptors interfaced with weighing devices and liquid-measuring devices. For example, cash and card acceptors used in liquid-measuring devices issue receipts with a fixed length so that the device can easily predict when it will run out of paper. Cash and card acceptors interfaced with weighing devices are predominantly used in point-of-sale interfaces with scales where the receipts can significantly vary in length. The cash acceptors at attended locations may also accept cash in large denominations where the customer is provided with a mechanism to receive all of their change. The *ad hoc* language was developed to include these types of applications. Additional applications include self-service vehicle scales where card acceptors are used to initialize the weighing of a vehicle and to issue printed tickets. Several Sector members stated that the current and *ad hoc* language in Publication 14 is sufficient for these applications.

The Weighing Sector also suggested some minor editorial changes to the language including replacing the term "terminated" with "canceled" since the latter term indicated that the transaction was stopped by a conscious decision of the customer as opposed to being automatically stopped by the device.

Conclusion/Recommendation: **The Weighing Sector recommends that the language to amend NCWM Publication 14 Electronic Cash Registers Interfaced with Scales in Appendix A-Agenda Item 12 be incorporated into the 2006 Edition of NCWM Publication 14.**

The Weighing Sector did not recommend new definitions of card-activated and/or cash acceptor systems for NIST Handbook 44.

13. Ranges Covered on the CC for a Railway Track Scale Based on the Device Evaluated

Source: 2005 NTEP Committee

Background: During the 2005 NCWM Interim Meeting, the NTEP Committee discussed an issue brought forward by a manufacturer regarding the title of Section 8.2 of NCWM Publication 14 Digital Electronic Scales, "Additional Criteria For Vehicle Scales, Railway Track Scales, Combination Vehicle/Railway Track Scales, and Other Platform Scales Greater Than 200 000 lb." The NTEP Committee reviewed information from the 1998 and 2000 Weighing Sector meetings that indicated that the Sector, during its 2000 meeting, recommended that an NTEP CC would apply to all models having nominal capacities no greater than the capacity of the scale submitted for evaluation. The Sector made no recommendations to change the length criteria from 135 % to 100 % of the scale submitted for evaluation in either the 1998 and 2000 meetings. However, the 2001 edition of Publication 14 included a change to the length criteria that limits the length of the family of scale to that of the device submitted for evaluation. The NTEP Committee instructed the NTEP Director to correct the Publication 14 language to reflect previous decisions of the sectors, identify the changes clearly in Publication 14, and place this item on the agenda for the 2005 meeting of the Weighing Sector for additional comments and recommendations.

The NTEP Participating Laboratories discussed this item during their April 2005 meeting in Columbus Ohio. The laboratories agreed with the changes recommended by the NTEP Committee. Additionally, they agreed that there are two remaining issues should be reviewed to determine if changes are needed to the criteria for (1) the allowable span between sections, and (2) platform widths based upon the device submitted for evaluation).

Discussion: The Weighing Sector reviewed issues on this topic in past Sector summaries. Don Onwiler, NTEP Committee, added that the NTEP Committee's changes to Publication 14 were based on the Sector summaries. The changes did not reflect the Committee's position on what is to be covered on the certificate for a railway track scale based on the device evaluated. He also stated that NCWM Publication 14 Administrative Policy J.4. Amending a pre-NTEP Certificate was modified based on the NTEP Committee discussion of an appeal that initiated review of the past Sector recommendations.

The Sector also discussed the criteria for the allowable span between sections and platform widths based upon the device submitted for evaluation that were identified by the NTEP Participating Laboratories during their April 2005 meeting. However, no specific language was discussed to amend Publication 14 Section 8.2.

Recommendation: **The Weighing Sector agreed with the changes approved by the 2005 NTEP Committee regarding the ranges to be covered on a CC. The Sector made no recommendations to amend that language in the 2005 Edition of Publication 14 Section 8.2. and no further action is recommended by the Sector at this time. Future recommendations to amend NCWM Publication 14 Section 8.2 should be submitted to the Sector for consideration.**

New Items

14. CLC for Combination Railway Track/Vehicle Scales

Source: Mettler Toledo – Scott Davidson

Background/Discussion: Mettler Toledo submitted a proposal to amend CLC requirements in section 8.3. by requiring a minimum CLC of 60 000 lb for the vehicle portion of a combination railway track/vehicle scale.

When using higher capacity load cells (e.g., by using load cells with larger mv/V ratings) within an approved load cell family, the manufacturer is forced to increase the CLC to meet 40 % of the summed capacity for two load cells required in NCWM Publication 14 paragraph 8.3.1 b (DES-7). Increasing the CLC requires additional NTEP testing even if the manufacturer does not want to increase the CLC rating, increase the structural strength of the weighbridge, or increase the scale capacities.

The minimum 60 000 lb CLC requirement was derived from NIST Handbook 44 Scales Code Table UR.3.2.1. Span Maximum Load and looking at 3 axles in 8 feet between the extremes of the axles at 17 000 lb per axle. It shows an "r" factor of 1.00. This means that there are 3 axles within a space of 8 ft, for a total of 51 000 lb for the maximum legal weight for a group of 3 axles. This value was rounded to 60 000 lb since many highway enforcement agencies allow a 10 % tolerance to axle-load weights and provides an additional factor for axle groups that exceed legal highway limits.

The v_{min} calculations for load cell suitability show that when using higher capacity load cells, the v_{min} is required to remain within the necessary values to meet the 20 lb increment size for the family of scales if the vehicle scale portion has a CLC that is no less than 60 000 lb.

Discussion - Part 1: The Sector reviewed a proposal from Mettler Toledo that recommended amending Publication 14 Digital Electronic Scales Part B, Section 8.3 Modular Load-Cell Vehicle, Livestock, or Railroad Track Scales, paragraph 8.3.1. (b) and adding a new paragraph 8.3.1. (c).

The Sector also reviewed recommendations from the NIST Technical Advisor for editorial changes to Publication 14 paragraph 8.3.1.(a) that are intended to avoid confusion and to clarify what is meant by structural strength (load cell or weighbridge), capacity (nominal or concentrated load), and family (scale or load cells).

Prior to the Sector meeting, Darrell Flocken, Mettler Toledo, had questioned the origin and purpose of the original language in Publication 14 paragraph 8.3.1.b. He made some inquiries and reported that the language was intended to address the loading of CLC and that it was possibly a cautionary note to prevent overloading of the load cells with a capacity less that 40 % of the CLC. Other Sector members stated that 8.3.1.b. is not needed since the CLC is calculated by the manufacturer based on the maximum load that can be applied by vehicles with tandem axles according to Handbook 44 Table UR. 3.2.1. Span Maximum Load and not load cell capacity. Another Sector member cautioned that paragraph 8.3.1.b. should not be removed until the reason for the existing language is understood.

After the meeting, the NIST Technical Advisor did some additional research in to the origin of the NTEP Technical Policy Section 8 paragraph 8.3.1.b. The language was originally developed and recommended during the June 1990 meeting of the NTETC Weighing Sector under agenda item VIII Criteria for Modular Vehicle Scale Parameters. A letter dated June 21, 1990, from Terry James, Vice-president Engineering Services at Cardinal Scale Manufacturing Company, stated that the "40 % of the sum of the capacity of two load cells" value for the minimum CLC was selected using the 50 000 lb load cell to establish a capacity with some safety factor based on the legal highway tandem axle load of 34 000 lb. The maximum CLC is the rated nominal capacity of the pair of load cells that comprise a section.

Recommendation Part 1: **The Sector recommends that the language submitted by Mettler Toledo, as amended by the Sector in Appendix A-Agenda Item 14, be incorporated into the 2006 Edition of NCWM 14.**

Discussion/Recommendation Part 2: **Brechbuhler Scales stated that their proposal in Sector Agenda Item 14 part 1 was no longer necessary based on the Sector discussion and recommendation for agenda item 14 part 1. No further action was recommended by the Sector.**

15. Abbreviations for Carat and Count in Publication 14 Sections 38. and 76.

Source: NIST Weights and Measures Division (WMD)

Background: WMD is in the process of developing an EPO and inspector's training manual for Class I and Class II precision balances. During this process, WMD reviewed NIST Handbooks 44 and 130, NCWM Publication 14, and several CC as sources for potential examples for metrological criteria such as methods of sealing, units of measurement, identification, and marking requirements that an inspector might find during a field inspection.

Research into the subject revealed that NIST Handbook 44 only recognizes the "c" as an acceptable abbreviation for carat in Section 2.23 Weights paragraph S.4.5. Carat Weights and in Appendix C General Table of Units of Measurement, Units of Mass (page C-17). NIST Handbook 130 Packaging and Labeling Regulations paragraph 6.7.1. Symbols and Abbreviations recognizes the "ct" as an acceptable abbreviation for count.

During the review of NCWM Publication 14, Section 76. List of Acceptable Abbreviations/Symbols, it was noted that the abbreviation "ct" is acceptable for both "carat" and for "count." This raises the question about Class I or II scales that may have an approved counting feature for prescription filling applications and also the "carat" as a unit of measurement since "ct" is listed in Publication 14 as an exception to the General Tables of W&M, in NIST Handbook 44. Problems would arise if the abbreviation "ct" were to be used on a device with both the "count" and the "carat" unit of measurement. An Internet search for the "abbreviation of carat" indicates that the jewelry industry uses both "c" and "ct" (c or ct = 200 mg) and the term "carat" is synonymous "carat troy." The abbreviation for "count" is also "ct" according to many dictionaries and Internet searches and was listed as an acceptable abbreviation in NCWM Publication 14 for "carats" and abbreviation for pieces on receipts and labels for items sold by count.

The abbreviation "ct" in Publication 14 was originally intended for scales that could display indications and print labels and receipts for items sold by count. The term "count" and its abbreviation "ct" was not intended to be used on a scale with an operational counting feature since the counting feature was, until 2003, prohibited in NIST Handbook 44.

The Sector was asked to consider amending the NCWM Publication 14 paragraphs 38.3.1. and 38.4., and Section 76. to eliminate any potential confusion between indications of carat weights and count when the carat weight unit and counting feature are enabled on the same scale.

Discussion: The NTEP laboratories stated that the abbreviation "ct" carat was not in Handbook 44 when it was recommended as an acceptable abbreviation for both carat and count in NCWM Publication 14. The "ct" abbreviation for carat is commonly used in the jewelry industry and language in Publication 14 paragraph 38.3.2 does not permit the abbreviation to be the same if a scale has both carat units and the counting option.

Some of the manufacturers state that they use the term "pieces" or the abbreviation "pcs" to identify count on their devices. Based on that comment, some of the Sector members suggested that Publication 14 language should encourage the use of this term and its abbreviation in Publication 14, Section 76.

The NTEP Director noted that the abbreviation "ct" for carat is not listed in NIST Handbook 44 and that NCWM Publication 14 allows the "ct" for carat, and that Handbook 44 should support the requirements and policies in Publication 14. Several laboratory members stated that the industry should not be penalized by not allowing the customary business practice of using "ct" as the abbreviation for carat. They felt that it would be obvious to the customer and user since a carat weight will include decimal values whereas a display of count will be in whole numbers.

Measurement Canada stated that their regulations recognize the "ct" for carat and that the "c" for carat is not accepted.

Recommendation: **The majority of the Sector agreed that "ct" is an acceptable abbreviation for the term carat since: the abbreviation is in common usage by the jewelry industry, "ct" has been listed in NCWM Publication 14 Table 76 List of Acceptable Abbreviations and Symbols since it was developed by the Sector at their December 8, 1992 meeting, "c" in not an acceptable abbreviation for count, and the obvious indication that carats are displayed decimal values and pieces or count are displayed as whole numbers.**

The Sector agreed to recommend that the amendments to NCWM Publication 14 submitted by the NIST technical advisor with changes recommended by the Sector in Appendix A-Agenda Item 15 be incorporated in the 2006 edition of Publication 14.

16. Performance and Permanence Test for Bench and Counter Scales

Source: Ohio NTEP Participating Laboratory

Background: The 2002 edition of NCWM Publication 14 Section 62. Performance and Permanence Test for Bench and Counter Scales paragraph 62.9.5. Test Load stated that 50 % of the maximum capacity, not to exceed 500 lb, of the bench or counter scale is to be repeatedly applied to the scale. The phrase "not to exceed 500 lb" was inadvertently omitted from subsequent editions of Publication 14.

The Sector was asked to review amendments to NCWM Publication 14 Section 63., paragraph 63.6.5.1. (Section 62. was renumbered to Section 63. in 2004) to include language that limits the test load to 500 lb for scales with a capacity greater than 1 000 lb.

Discussion: Two of the five NTEP laboratories authorized to conduct type evaluations on scales below 2000 lb (1000 kg) have the ability to test 2000 lb scales with 1000 lb on their repetitive test equipment. The other laboratories test for permanence on these scales with loads not to exceed 500 lb. Measurement Canada's test equipment applies loads not to exceed 250 kg for scales no greater than 2000 kg. The Sector agreed that any changes to Publication 14 should be compatible with Measurement Canada and NTEP-Canada Mutual Acceptance Program. Many of the manufacturers stated that they believe the severity of the test should be the same for all evaluations of these devices. There were also suggestions that the language should include metric capacities.

Recommendation: **The Sector voted (12 in favor and 1 opposed) to amend the Ohio proposal and change the "load not to exceed 500 lb" to "load not to exceed 250 kg (550 lb)" and recommended that the amended language Appendix A-Agenda Item 16 be incorporated into the 2006 Edition of NCWM Publication 14.**

17. Minimum Height of Weight and Units Indications

Source: New York NTEP Participating Laboratory

Background: The New York NTEP Participating Laboratory reported the height of the indications of weight and the corresponding units of measure on recent several scales submitted for NTEP evaluations are getting smaller and questioned when displays are too small. Neither NIST Handbook 44 nor NCWM Publication 14 have requirements or suggestions for the evaluation of these displays. New York submitted an example of a scale with a unit of measure display that is 4 mm (incorrectly reported as 2 mm in the Sector agenda) in height.

The Weighing Sector discussed a similar item in 1999 and submitted a proposal to add language to the General Code the that would establish a minimum height requirement for primary measurement indication to the customer (see the 2000 85th NCWM Annual Meeting Report of the S&T Committee Item 310-4). The S&T Committee withdrew the proposal because of opposition and asked the Weighing Sector to conduct additional work to clarify the intent of the requirement and ensure it applies to the appropriate applications.

Discussion: The Sector was asked to review the background information and an example from the New York NTEP laboratory demonstrating the height of the units display compared to the weight display.

The Sector also reviewed a proposal from the New York and Maryland NTEP laboratories for a new NIST Handbook 44 specification paragraph that specifies the minimum height requirements for primary weight indications and units of measure.

G-S.5.2.3. Size and Character.

(a) In any series of graduations, indications, or recorded representations, corresponding graduations and units shall be uniform in size and character. Graduations, indications, or recorded representations that are subordinate to or of a lesser value than others with which they are associated shall be appropriately portrayed or designated. [Retroactive as of January 1, 1975]

(b) The display of primary measurement indications on both the operator and the customer side shall be clear and at least 9.5 mm in height.
[Nonretroactive as of January 1, 200X]

(c) The display of the character size of the units of mass, on both the operator and the customer side, shall be no less than a factor of 0.6 times the width and 0.6 times the height of the numeric values.
[Nonretroactive as of January 1, 200X]

The NIST Technical Advisor provided the following information for consideration during the discussion of this item.

Handbook 44 Section 5.54 Taximeters, Sections 5.56.(a) and 5.56.(b) Grain Moisture Meters, and Section 5.57. Near-Infrared Grain Analyzers already include specifications for the minimum height of figures, words and symbols.

OIML R 76 Non Automatic Weighing Systems states that the minimum height of weight indications is 9.5 mm, and 2 mm for capital letters on required markings.

OIML R 117 Measuring Systems for Liquids Other Than Water states that the minimum height of the quantity indication on fuel dispensers 10 mm (4 mm for other liquid-measuring devices) with the minimum height of the price indication no less than 4 mm.

Additionally, "unit of measurement" should replace "unit of mass" in the proposed paragraph G-S.5.2.3. to be consistent with Handbook 44 language since the requirement would apply to all weighing and measuring devices. For example, paragraph G-S.5.3.1. On Devices That Indicate in More that One Unit. refers to the "unit of measurement."

One of the manufacturers stated that the proposal is more restrictive than the language in OIML R 76 since OIML R 76 states that the height requirement applies to direct sale applications and prefers that the height of the analog weight indications be based on the distance between the customer and the indicting device, and that R 76 OIML also states a minimum 2 mm for marked information. Additionally, annunciators such as "▲" that point to the units of measures are often smaller than 2 mm in height and manufacturers are limited to the display heights from their vendors. Other manufacturers stated that the marketplace will decide what is an acceptable height for weight displays. They added that the costs for a vendor to tool up for a custom display would be prohibitive. The manufacturers were also concerned about indicating elements such as video display monitors where the height of the weight values may change with the height of the display (monitor). The NIST technical advisor suggested that a user requirement could be developed for users that replace indicating elements with indicating elements that are not from the original equipment manufacturer.

The Maryland NTEP laboratory stated that the New York laboratory's (The New York Sector member was unable to attend the meeting) concern was primarily with the height of the lettering of the unit of measure in their example and that both the Maryland and New York laboratories are agreeable to limit the language for minimum height requirements to direct sales to the public applications. Don Onwiler, Nebraska NTEP laboratory, stated that there will be some applications where the device complies with the minimum requirements but may still be difficult to read because of the distance or the brightness and contrast of the display. Don Onwiler added that officials may have to be educated that the proposal does not conflict with Handbook 44 General Code G-S.5.1. General (Indicating and Recording Elements), G-UR.2.2. Installation of Indicating or Recording Elements, G-UR.3.3. Position of Equipment when the device complies with the specific height requirements in the Scales Code but is still not clear and easily read because of the individual circumstances of the installation.

Recommendation: **The Sector agreed that any proposal to specify the height of the weight display and units indications in NIST Handbook 44 should be limited to the Scales Code and should align with OIML R 76 to the extent possible. The size requirements should be limited to weight indications visible to the customer in direct sale applications, the weight display should be no smaller than 9.5 mm, and the units display or marking should be no smaller that 2 mm.**

The NIST technical advisor, the New York and Maryland laboratories, and Jesus Zapien (A&D Engineering) were asked to rework the proposal in the agenda based on the recommendations of the Sector. The Sector will be balloted on the language developed by the small work group and submitted, if acceptable, for consideration to the Southern Weights and Measures Association at their 2005 annual meeting and the NCWM Review panel during the week of October 23, 2005.

18. Automatic Weighing Systems Influence Factor Temperature Ranges that Exceed –10 °C to 40 °C

Source: Ohio NTEP Participating Laboratory

Background: The Ohio NTEP Participating Laboratory has received NTEP applications to evaluate automatic weighing systems (AWS) with temperature ranges that exceed the standard temperature range of –10 °C to 40 °C. The applicant made the request on behalf of their customer since the AWS may be used in environments that are warmer than 40 °C

(104 °F). Handbook 44 Section 2.28 Automatic Weighing Systems Table S.7.b., footnote 5 states that the temperature range shall be marked "only on automatic weighing systems if the range is other than –10 °C to 40 °C (14 °F to 104 °F)."

The laboratory stated that testing above 40 °C or below –10 °C puts an unnecessary strain on both the environmental chamber and the NTEP technician who has to go into the chamber to perform the tests. There are some CC already issued with a stated temperature higher than 40 °C, but the vast majority of these are "Provisional" CCs for Wheel Load Weighers where no temperature testing has ever been performed by NTEP. If the NTEP laboratories ever acquire the capability to temperature test these devices in order to change the status of the CC from "Provisional" to "Full", they will most likely revert to the standard temperature range. There is at least one CC for a Class III scale that has a temperature higher than 40 °C stated on it (CC 92-213A2) and was tested at that temperature.

The laboratory is also concerned that other manufacturers will very likely decide that their device would be more marketable to a customer if it has been tested at 50 °C. This would turn the NTEP CC into an advertising tool and may initiate a never-ending escalation of temperature test requests from manufacturers.

The NIST Technical Advisor reported that OIML R 76 Non-automatic Weighing Systems paragraph 3.9.2.1. Prescribed temperature and 3.9.2.2. Special temperature limits and OIML R 51 Automatic Catchweighing Instruments and other OIML Recommendations have similar temperature marking requirements as the AWS code and other Handbook 44 codes.

Discussion: The Sector was asked to review the background information and consider submitting a proposal from the Ohio NTEP Participating Laboratory to amend Handbook 44 Section 2.28 Automatic Weighing Systems Table S.7.b. footnote 5 to the next meeting of the Southern Weights and Measures Association. The proposed language is identical to Handbook 44 Section 2.20. Scales Code Table S.6.3.b. Notes for Table S.6.3.a. footnote 5.

Table S.7.b. Notes for Table S.7.a.
5. Required only on automatic weighing systems if the range <u>on the NTEP CC is narrower</u> ~~other~~ than <u>and within</u> –10 °C to 40 °C (14 °F to 104 °F).

The NIST Technical Advisor recommended that Handbook 44 Sections 2.21. Belt-Conveyor Scale Systems paragraph S.4.e. Markings Requirements, 2.22. Automatic Bulk Weighing Systems paragraph S.5. Markings Requirements, and 5.58. Multiple Dimension Measuring Devices Table S.1.4.b. Notes for Table S.1.4.a. be amended to be consistent with the Scales Code.

The Sector commented that the language for the influence factor temperature requirements is worded differently among the various weighing device codes even though the range of temperatures is consistent (–10 °C to 40 °C). Unlike the Handbook 44 Scales Code paragraph T.N.2.3. Subsequent Verifications, not all of the weighing device codes in Handbook 44 include the language that states that tolerance values apply regardless of the influence factors in effect at the time of the conduct of the examination. Additionally, weighing devices that are marked with a temperature range may not be <u>suitable</u> to the installations if it is used in applications where the ambient temperature exceed that temperature range that is marked on the device Handbook General Code paragraphs G-UR.1.2. Environment (Selection Requirement) and G-UR.3.1. Method of Operation states that equipment shall be suitable for the environment in which it is used and operated only in a manner that is indicated by instructions on the device.

The NTEP Director stated that the AWS Code marking requirements are restrictive because the <u>suitability</u> of the device can be determined by the marking on the device. For example, Handbook 44 Scales Code Table S.6.3.a. Marking Requirements Note 5 states that the temperature range shall be marked on the device if the range is ***narrower than*** –10 °C to 40 °C, whereas AWS Code Table S.7.a. Marking Requirements Note 5. states that the markings are required if the temperature range is ***other than*** –10 °C to 40 °C. The NTEP Director is also concerned by the use of the term "temperature limit" in Scales code paragraph T.N.8.1.1. and T.N.8.1.2. and similar language in the other weighing device codes, and that the "limits" could be misinterpreted as a consideration for the suitability of a device at a particular installation.

The manufacturers believe that the range of temperature testing needs to be the same among the NTEP laboratories, otherwise, applicants will select the NTEP laboratories that have a greater temperature testing capabilities creating an uneven workload for all the NTEP Participating Laboratories. The manufacturers also believe that the testing for compliance with temperature influence factor requirement should not be below –10 °C or above 40 °C to avoid expanded temperature ranges listed on the CC being used by applicants for marketing purposes. One manufacturer suggested that the range of testing should be specified in Handbook 44. The NTEP Director added that Handbook 44 does not specifically state that temperatures tests are required if the device is marked with a temperature range that is wider or other than –10 °C to 40 °C.

The NTEP laboratories were concerned that a device may be marked with a temperature range wider than the temperature tests listed in the test conditions in the CC since the CC only lists the temperatures that were tested on the device (Note: This is not a concern for devices with a marked temperature range that is narrower than –10 °C to 40 °C since compliance with the narrower temperature range is verified during NTEP evaluation).

A question was asked if an applicant could request that the CC be listed with a temperature range wider than –10 °C to 40 °C if the applicant provided credible data that the device complies with the expanded temperature range. The Sector believed that a policy listing a wider temperature range on the CC than what was larger that the temperature range verified by NTEP would lead to applicants taking advantage of the larger temperature range and inferring that the quality of the device was better than other devices that were listed with the standard temperature range. Darrell Flocken, Mettler Toledo, added that influence factor testing for temperature should not be a quality or marketing issue, temperature tests verify compliance with Handbook 44, and that applicants can demonstrate the knowledge and the ability to comply the requirements. Russ Wykoff, Oregon NTEP laboratory, asked what will happen if a manufacturer marks the device with a larger temperature range than the –10 °C to 40 °C that was evaluated during type evaluation. The manufacturers responded that NTEP cannot control additional identification information marked on the device since the manufacturer must also comply with the marking requirements of other agencies that may be different than the temperature markings for other purposes than the accuracy requirements in Handbook 44.

Recommendation: **The Sector agreed that the range of temperatures over which the NTEP laboratories will conduct temperature tests are –10 °C for the lowest temperature tested and +40 °C as the highest temperature. The Sector recommends that that NCWM Publication 14 Technical Policy B.1. Influence Factor Requirements and K. 59. Tests Procedures for Influence Factors, be amended and shown in Appendix A-Agenda Item 18 to limit the scope of temperature test that will be conducted by the NTEP laboratories.**

The Sector did not provide a recommendation to amend NIST Handbook 44 AWS Code Table S.7.b. Note 5 at this time. The Sector believes that a more thorough review of Handbook 44 paragraph G-UR.1.2. Environment, and Scales Code Table S.6.3.b. Note 5 and paragraphs T.N. 2.3. Subsequent Verification and T.N.8.1. Temperature is needed in order to assure that suitability, marking, and performance requirements are consistent throughout Handbook 44 weighing sections, and that the temperature limits specified in the handbook are correctly applied by field officials in determining the suitability of a weighing device in various installations. Darrell Flocken will ask the SMA to take on this assignment and bring a recommendation back to the NTEP laboratories and the Weighing Sector during their 2005 Fall meeting.

Todd Lucas, (NCWM S&T Committee) agreed to update the 2006 NCWM S&T Committee about the sector discussions and recommendations and that "clean-up" work has been identified regarding Handbook 44 language for subsequent tests, temperature limits, and marking requirements in order that the language is consistent throughout in NIST Handbook 44 Section 2.

Lou Straub, Fairbanks Scales, agreed to notify the NCWM Review Panel at their next meeting that the SMA and Weighing Sector may be developing future proposals to amend NIST Handbook 44 temperature marking, performance, and suitability requirements.

Juana Williams (NIST), Steven Cook (NIST), and Darrell Flocken (Mettler Toledo) agreed to develop a summary paragraph, with points that need to be addressed (e.g., temperature testing at the time of the NTEP evaluation vs. ambient temperature during subsequent verifications and the marked temperature range).

19. Criteria for Railway Track Scales With a Rotary Dump Option

Submitted by: Bob Feezor, Norfolk Southern Corporation

Background: Manufacturers of rotary dump mechanisms for railway track cars offer a weighing option where a railway track scale is built into, or installed in the rotary dump mechanism. The manufacturers of these systems frequently believe that the railway track scale is approved for this application (or in some cases, just the load cells and indication elements), and is covered by an NTEP CC. Additionally, there are many existing rotary dump mechanisms that were installed prior to the formation of NTEP that are nearing the end of their useful life and the users of these devices are requesting that the railway track scales be covered by NTEP CCs. The submitter of this item is concerned there are no documented policies and test criteria for these devices, and therefore promotes inconsistent enforcement of the NTEP requirements on these devices.

NTEP and the laboratories have consistently stated that a railway track scale CCs must include the rotary dump mechanism must be verified by NTEP and subsequently listed on the CC. The problem is that this policy is not documented in NCWM Publication 14, nor are there any documented procedures to test the rotary dump scales.

Robert Feezor recommend recommended that *ad hoc* policies and test criteria should be developed to add the rotary dump mechanism as a feature on the.

Recommendation: **The Sector agreed with the submitter that the rotary dump option should be included on CCs for railway track scales, and that NTEP Technical Policies and test criteria are needed for Pub 14. Robert Feezor and Steve Cook agreed to draft technical policies and test criteria will be developed and submitted for the 2006 meetings of the NTEP Labs and Weighing Sector.**

20. Permanence Tests for Identification Information

Submitted by: Stephen Patoray, NTEP Director

Background: NCWM Publication 14 Section 1. Marking Complete Scales addresses permanence testing of identification information on complete scales. The sections for indicating elements, weighing/load-receiving elements, and livestock, vehicle, and railway track scales do not have any requirements for the permanence testing of the identification information and do not refer to the procedures in section 1.

Recommendation: **The Sector recommends that the sections for marking requirements be consolidated and reorganized. The NIST technical advisor has worked on a proposed consolidation of the marking requirements that removes language that is repeated in Sections 2 though 5 and referenced the general requirements in Section 1; the proposed consolidation that has been re-titled as 1. Marking- Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales. The NIST technical advisor will also ballot the Sector on the proposed changes in Appendix A-Agenda Item 1(c) and report the results to the NTEP Committee prior to the 2006 NCWM Interim Meeting.**

NIST Technical Advisor's Note:

The Sector recommendation to amend the capacity markings sections of Publication 14 in **Appendix A-Agenda Item 1(c)** have been consolidated with the Sector recommend changes in Agenda Item 20. Permanence Tests for Identification Information.

21. Next Sector Meeting

Discussion: The locations for Weighing Sector meetings are typically rotated among the participating NTEP laboratories. If this schedule is followed, the location for the 2006 Weighing Sector meeting would be at the Maryland NTEP Participating Laboratory in Annapolis, Maryland. The Sector received a recommendation to hold the 2006

meeting in conjunction with the 2006 Western Weights and Measures Association Technical Conference. Another recommendation is to hold the meeting on a Tuesday through Thursday, since many airlines no longer have Saturday night layover restrictions. Lou Straub, Fairbanks Scales, cautioned that there are large annual boat shows and Naval Academy events in the fall that may affect the cost of lodging during the Sector meeting.

Recommendation: The Sector recommends that the next 2006 Sector meeting be held in Annapolis, Maryland, and that it start on a Tuesday. The Sector also recommended that NCWM headquarters look into holding the 2007 meeting of the Weighing Sector in conjunction with the WWMA Technical Conference in Lake Tahoe, Nevada.

Appendix A

Recommendations for Amendments to Publication 14

General Note. Unless otherwise noted, the following language from the 2005 edition of NCWM Publication 14 language that includes proposed changes are highlighted in gray. Revisions recommended by the Sector are shown by ~~crossing out~~ information to be deleted and underlining information to be added.

Agenda Item 1 (a) Footnote to S.1.8.4.

Digital Electronic Scales Section 76. List of Acceptable Abbreviations/Symbols

Device Application	Term	Acceptable	Not Acceptable
ECRs, Recorded Representations:	net weight indication in pounds	"pound" or "lb" ~~the symbol "#" should be discouraged~~	the "#"symbol for pound

Electronic Cash Registers Interfaced with Scales Section 11. Recorded Representation Point-of-Sale Systems

11.1. Customer's receipts must contain:

11.2. Net weight identified by the word "pound", "lb", "kilogram", "kg", "gram", "g", "ounces", ~~or~~ "oz". The use of the symbol "#" for pound is not acceptable ~~discouraged~~. **Yes ☐ No ☐ N/A ☐**

Agenda Item 1 (b) Automatic Zero-Setting Mechanism (Zero-tracking)

43. Automatic Zero-Setting Mechanism (AZSM) (Zero Tracking)

Code References: S.2.1.3., S.2.1.3.1., S.2.1.3.2., and S.2.1.3.3~~1~~.

A scale may be equipped with an AZSM capability to automatically correct for weight variations near zero within specified limits. To reduce the potential for weighing errors, the AZSM may operate only under limited conditions as indicated in the specific type evaluation criteria.

Class III L and III/III L devices equipped with AZSM, shall be designed with a sealable means to allow the AZSM to be disabled during the inspection and test of the device.

The limits for AZSM are:
(a) for bench, counter, and livestock scales manufactured prior to January 1, 2007 *: 0.6 d
(b) for vehicle, axle-load, and railway track scales: 3.0 d; ~~and~~
(c) for all other scales manufactured prior to January 1, 2007 *: 1.0 d, and
(d) for all other scales including bench, counter, and livestock scales manufactured on or after January 1, 2007 *: 0.5 d.

*Note: Applicants for new weighing device and load-receiving elements are encouraged (but not required) to submit their devices to the 2007 criteria. September 2006 is the cutoff date for new submissions for devices that limit the AZSM to 0.6 d and/or 1.0 d *. All scales of this category manufactured after 2007 must comply with the 0.5 d requirement.*

**(date of manufacture and sections (a) and (c) to be deleted in the 2007 edition of Publication 14)*

Record the AZSM capability provided.

- ☐ No AZSM capability.
- ☐ AZSM is always operational. (except for Class III/III L and III L devices)
- ☐ AZSM activated or deactivated by an external switch.
- ☐ AZSM activated or deactivated by an internal switch or selected by programming at the time of installation.
- ☐ The magnitude of the AZSM increment is selectable.

For ~~devices~~ bench, counter, and livestock scales falling under S.2.1.3.1. (a) and S.2.1.3.2 (b),~~ for that is, bench, counter, and livestock scales,~~ AZSM may be operable with the device at a gross load zero, at a net load zero, or at a negative net weight indication resulting from a tare weight entry having been made with the scale at zero gross load.

For scales other than bench, counter, and livestock scales falling under S.2.1.3.1. (a) and S.2.1.3.2. (b), and vehicle, axle-load and railway track scales, AZSM may be operable only at a gross load zero.

Indicate where AZSM is operational.

- ☐ Gross Zero
- ☐ Net Zero
- ☐ Negative with Tare

Test Procedure for AZSM: With the scale at zero balance, place a load in excess of the AZSM range for the scale, e.g., 10d. Add error weights that are slightly in excess of the specified AZSM limit for the device or the AZSM setting. Remove the load, (e.g., 10d) but leave the error weights on the scale. Observe whether or not the scale automatically zeroes the error weights. Repeat this procedure by decreasing or increasing the amount of error weights to determine the zeroing range of the AZSM. Perform this test in an analogous manner on the negative side of zero to determine the zero range of AZSM on the negative side of zero.

If the device has an AZSM capability, record the maximum amount (in scale divisions) that can be zeroed at one time.

- ☐ AVOIRDUPOIS: _____ d
- ☐ METRIC: _____ d
- ☐ OTHER UNITS Identify units_____ d

43.1.	This amount must comply with S.2.1.3. for the intended application.	**Yes** ☐ **No** ☐ **N/A** ☐
43.2.	AZSM shall not be operable on any hopper scale.	**Yes** ☐ **No** ☐ **N/A** ☐
43.3.	For vehicle, axle-load, and railway track scales, and ~~devices~~ scales other than bench, counter, and livestock scales~~ falling under S.2.1.3. (b) and (c)~~ AZSM may be operable only at a gross load zero.	**Yes** ☐ **No** ☐ **N/A** ☐
43.4.	AZSM shall not be operational when the scale is displaying a positive weight value greater than the maximum AZSM quantity allowed.	**Yes** ☐ **No** ☐ **N/A** ☐
43.5.	~~Devices falling under S.2.1.3.1.~~ Hopper scales used in automatic bulk-weighing systems and all Class III L scales shall be equipped with a sealable means to enable/disable or set the AZSM window to zero (0) for testing and inspection.	**Yes** ☐ **No** ☐ **N/A** ☐

Agenda Item 1 (c) and 20. Table S.6.3.b. Note 3 – Nominal Capacity and Value & Permanence Tests for Identification Information

Note: The following proposed amendments to Publication 14 includes the changes recommended in Agenda Item 1 (c) and Agenda Item 20 and includes the language that approved by the Sector in Ballot number 91-04 with changes recommended by NIST WMD that deletes the example of a portable beam scale from the example of scales that did not need capacity markings.

The results of the vote were forwarded to the NTEP Committee prior to the 2006 NCWM Interim Meeting.

1. Marking- Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales
Code References: G-S.1. and G-S.7.: General Code Requirements, Identification

•
•
•

Marking - Accuracy Class, Verification Scale Division, and Temperature Limits
Code References: S.6., Table S.6.3.a., and Table S.6.3.b.

•
•
•

Marking Nominal Capacity, Value of the Scale Division, Special Applications
Code References: S.6., S.6.6., Table S.6.3.a., and Table S.6.3.b.

This requirement applies to digital indicating elements and to both the operator's and customer's indications on complete scales. The lettering must be permanent as described in Ssection 1, but the attachment of any badge or decal is slightly less stringent than for the G-S.1. information. In terms of attachment, any badge or decal must be "durable," that is, it must be difficult to remove (at all temperatures). Remote weight displays (except "scoreboard" displays), the customer's weight display provided for scales interfaced with electronic cash registers (ECRs), and weight displays which are built into ECRs must be marked with the scale capacity and scale division. The nominal capacity shall be shown together with the value of the scale division (e.g., 15 x 0.005 kg, 30 x 0.01 lb, or capacity = 15 kg, d = 0.005 kg) in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator.

The system must be clearly and permanently marked on an exterior surface, visible after installation, as follows:

1.1 The name, initials, or trademark of the manufacturer or distributor. A remote display is required to have the manufacturer's name or trademark and model designation. (Code Reference G-S.1.) **Yes ☐ No ☐ N/A ☐**

1.13. The nominal capacity by minimum scale division shall ~~clearly and conspicuously~~ be marked in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device ~~adjacent to the weight display (acceptable location depends on conspicuousness)~~. **Yes ☐ No ☐ N/A ☐**

This applies to mechanical scales, such as portable platform scales, with removable counterpoise weights marked since; 1) the markings on the weights are not readily apparent by viewing the reading face of the scale, 2) the additional weights are not a permanent part of the scale, and 3) additional weights can be added to the scales to incorrectly increase the capacity of the scale.

1.14. The capacity by division size shall be marked for all weight units that can be displayed such as in both pounds and kilograms. **Yes ☐ No ☐ N/A ☐**

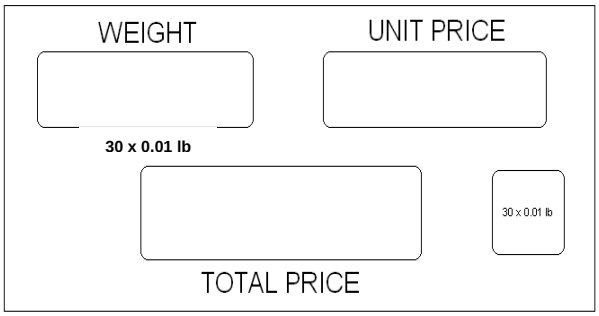
1.15. If equipped with variable resolution, the scale shall be marked with the weight ranges and corresponding scale division sizes. **Yes ☐ No ☐ N/A ☐**

Example:	0-3 kg (6 lb) x 1 g (0.002 lb)		0-6 lb x 0.002 lb
	3-6 kg (15 lb) x 2 g (0.005 lb)	or	6-15 lb x 0.005 lb
	6-15 kg (33 lb) x 5 g (0.01 lb)		15-33 lb x 0.01 lb

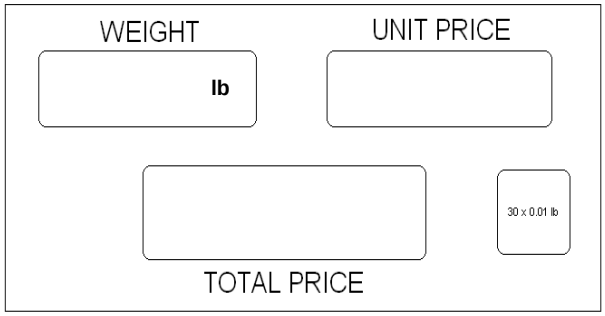
1.16. If the capacity by division statement is displayed on a video terminal with the weight values, then the capacity by division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device ~~adjacent to the weight display~~ and displayed whenever the system is in the weighing mode. **Yes ☐ No ☐ N/A ☐**

The following examples represent capacity and value markings that are conspicuous and readily apparent when viewing the reading face. Each scale division value or weight unit shall be marked on multiple range or multi-interval scales ~~The capacity by division statement may be part of the scale display or marked adjacent to the display.~~

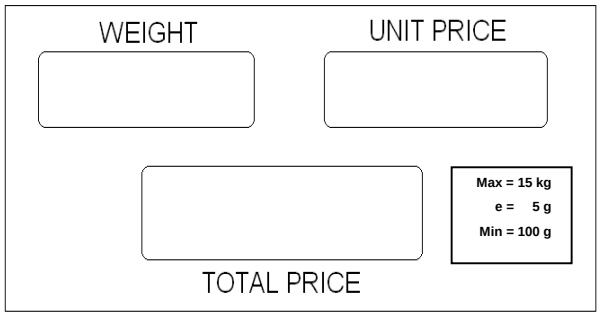
The capacity by value markings are not required if they are already apparent by the design of the device such as the largest weight value that is defined on a single revolution scale, fan scale, and beam scales and balances.



Example 1

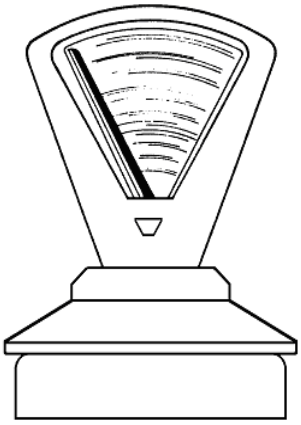


Example 2

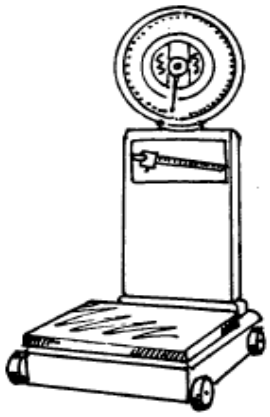


Example 3

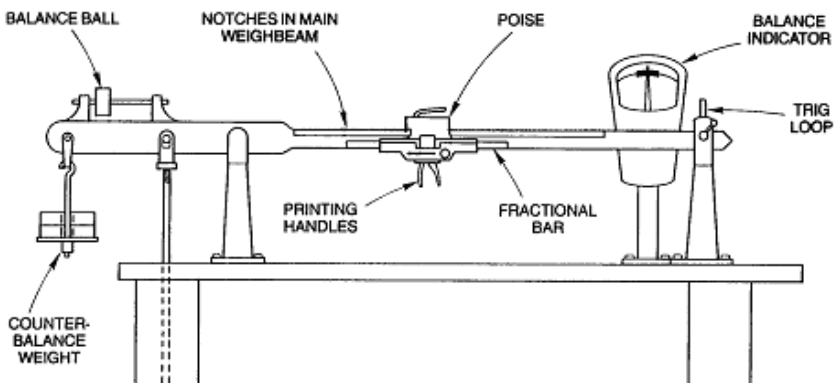
The following examples are types of scales where the capacity by scale division is readily apparent since the graduations, and beam capacities are marked with their respective values.



Full Capacity Fan Scale



Portable Platform
Single Revolution Dial Scale



Full Capacity Type Registering Beam

1.17. Scales designed for special applications must be conspicuously marked to limit their use. **Yes ☐ No ☐ N/A ☐**
Special marking used: _____

1.23.3. The indicator is electronically linked to the weighing/load-receiving element and cannot be replaced without calibration. **Yes ☐ No ☐ N/A ☐**

2. Additional Marking Requirements- Indicating Elements

Weighing/load-receiving elements and indicators that are; (1) in the same housing, or (2) permanently hard wired together, or (3) sealed with a physical seal or an electronic link, shall have markings that comply with Section 1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales.

Code References: S.6., Table S.6.3.a., and Table S.6.3.b.

Since the United States permits indicating and weighing/load-receiving elements …

~~2.1.~~ ~~The name, initials, or trademark of the manufacturer. A remote display is required to have the manufacturer's name or Trademark and model designation. (Code Reference G-S.1.)~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.2.~~ ~~The manufacturer's model designation that positively identifies the type or design. The Model designation shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the term "Number or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) The abbreviation for the word "Model" shall be "Mod" or Mod." (Code Reference G-S.1.)~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.3~~ ~~Except for equipment with no moving or electronic component parts, a non repetitive serial number. (Code Reference G-S.1.)~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.4.~~ ~~The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number. (Code Reference G-S.1.)~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.5.~~ ~~The serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). (Code Reference G-S.1.)~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.6.~~ ~~[Code Reference G-S.1. (g).]~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~The NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number." The abbreviation shall as a minimum begin with the letter "N" (e.g., No or No.).~~

~~The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. If the area for the CC number is not part of an identification plate, note its intended location and how it will be applied.~~

~~Location of CC Number if not located with the identification information: _____~~

~~2.7.~~ ~~If the information required by G-S.1. is placed on a badge or plate, the badge or plate must be permanently attached to the device. (See criteria above for permanence of Attachment of Badge.)~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.8~~ ~~Identifying information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.9.~~ ~~The indicator is marked with its accuracy class. Indicate class: _____~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.10.~~ ~~The device meets all the parameters for the accuracy class.~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

2.1~~1~~. The indicator is marked with the maximum number of scale divisions (for each accuracy class) for which it complies with requirements. **Yes ☐ No ☐ N/A ☐**

2.1~~2~~. The system shall be marked with the operating temperature range if the temperature range is other than 14 °F to 104 °F (–10 °C to 40 °C). **Yes ☐ No ☐ N/A ☐**

~~2.13.~~ ~~The nominal capacity by minimum scale division shall be clearly and conspicuously marked adjacent to the weight display (acceptable location depends on conspicuousness).~~ **~~Yes~~ ☐ ~~No~~ ☐ ~~N/A~~ ☐**

~~2.14. The capacity division size shall be marked for all weight units that can be displayed, such as, both lb and kilograms.~~ **~~Yes ☐ No ☐ N/A ☐~~**

~~2.15. If equipped with variable resolution, the scale shall be marked with the weight ranges and corresponding scale division sizes.~~ **~~Yes ☐ No ☐ N/A ☐~~**

~~2.16. If the capacity by division statement is displayed on a video terminal with the weight values, then the capacity by division statement must be adjacent to the weight display and displayed whenever the system is in the weighing mode.~~ **~~Yes ☐ No ☐ N/A ☐~~**

~~2.17. All markings must be clear and easily readable.~~ **~~Yes ☐ No ☐ N/A ☐~~**

~~2.18. The lettering must be permanent (use the procedures outlined in section 1 for "Permanence of Lettering"). Record the grade for the permanence of markings: _____~~ **~~Yes ☐ No ☐ N/A ☐~~**

2.~~3~~19. The badge or decal must be durable (difficult to remove at all temperatures). **Yes ☐ No ☐ N/A ☐**

2.~~4~~20. If the indicator is for Class III/III L applications, the "CLC" (concentrated load capacity) shall be marked on or adjacent to the identification markings or nomenclature plate that is attached to the system. (or space provided to include the CLC). **Yes ☐ No ☐ N/A ☐**

2.~~5~~21. The section capacity of a railway track and livestock scale-indicating element shall be marked on or adjacent to the identification badge on the indicating element. The section capacity shall be prefaced by the words "Section Capacity" or an abbreviation of that term. Abbreviations shall be "Sec Cap" or "Sec C." All capital letters and periods may be used. **Yes ☐ No ☐ N/A ☐**

3. Additional Marking Requirements- Not Built-for-Purpose Software-Based Devices

Code Reference: G.S.1.1.

3.1. At least one of the following methods must be used:

3.1.1. The manufacturer or distributor and the model designation are marked on the device according to Section 1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales. **Yes ☐ No ☐ N/A ☐**

4. Additional Marking Requirements – Weighing/Load-Receiving Elements

Code References: S.6., Table S.6.3.a., and Table S.6.3.b.

Weighing/load-receiving elements and indicators that are; (1) in the same housing, or (2) permanently hard wired together, or (3) sealed with a physical seal or an electronic link, shall have markings that comply with section "1 Markings - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales." This does not apply…

~~4.1. The name, initials, or trademark of the manufacturer or distributor. A remote display is required to have the manufacturer's name or trademark and model designation.~~ **~~Yes ☐ No ☐ N/A ☐~~**

~~4.2. A model designation that positively identifies the pattern or design of the device. The Model designation shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the term "Number or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)The abbreviation for the word "Model" shall be "Mod" or "Mod." (Code Reference G-S.1.)~~ **~~Yes ☐ No ☐ N/A ☐~~**

~~4.3.~~	~~Except for equipment with no moving or electronic component parts, a Non-repetitive serial number. (Code Reference G-S.1.)~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
~~4.4.~~	~~The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number. (Code Reference G-S.1.)~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
~~4.5.~~	~~The serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). (Code Reference G-S.1.)~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
~~4.6.~~	~~[Code Reference G-S.1. (e).]~~ ~~The NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number."~~ ~~The abbreviation shall as a minimum begin with the letter "N" (e.g., No or No.).~~ ~~The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. If the area for the CC number is not part of an identification plate, note its intended location and how it will be applied.~~ ~~Location of CC Number if not located with the identification information: _____~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
~~4.7.~~	~~If the information required by G-S.1. is placed on a badge or plate, the badge or plate must be permanently attached to the device. (See criteria above for permanence of Attachment of Badge.)~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
~~4.8.~~	~~Identifying information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
4.~~1~~9.	The nominal capacity of the weighing/load-receiving element.	**Yes** ☐ **No** ☐ **N/A** ☐
4.2~~1~~0.	Its accuracy class. Indicate class: _____	**Yes** ☐ **No** ☐ **N/A** ☐
~~4.11.~~	~~The device meets all the parameters for the accuracy class.~~	~~**Yes** ☐ **No** ☐ **N/A** ☐~~
4.3~~1~~2.	The maximum number of scale divisions for which it complies with requirements.	**Yes** ☐ **No** ☐ **N/A** ☐
4.4~~1~~3.	The minimum verification scale division for which it complies with requirements.	**Yes** ☐ **No** ☐ **N/A** ☐
4.5~~1~~4.	The weighing/load-receiving element shall be marked with the operating temperature range if the temperature range is other than 14 °F to 104 °F (–10 °C to 40 °C).	**Yes** ☐ **No** ☐ **N/A** ☐
4.6~~1~~5.	The lettering must be permanent. Record the grade for the permanence of markings: (Use procedures in section 1.)	**Yes** ☐ **No** ☐ **N/A** ☐
4.7~~1~~6.	If the information is placed on a badge or plate, the badge or plate must be permanently attached to the device. If a badge, label, or plate made of a metal or plastic is used, then it must be riveted, welded, or attached to the scale by an adhesive so that a tool is required to remove it (bolts or removable screws are not acceptable).	**Yes** ☐ **No** ☐ **N/A** ☐
4.8~~1~~7.	The information must be mounted on a protected surface such as the side of the weighing/load-receiving element, behind a ramp or under a cover plate. Access to the marking should be available with minimum effort.	**Yes** ☐ **No** ☐ **N/A** ☐

Location of the required identification information:

_____

4.9~~18~~. The information must be on a surface that is an integral part of the chassis. **Yes ☐ No ☐ N/A ☐**

~~4.19. All markings must be clear and easily readable.~~ **~~Yes ☐ No ☐ N/A ☐~~**

4.10~~20~~. The identification information for the weighing/load-receiving elements of vehicle, axle-load, livestock, and railway track scales shall be located: **Yes ☐ No ☐ N/A ☐**

4.10~~20~~.1. Near the point where the signal leaves the weighing/load-receiving element. This would be the transverse lever on a mechanical scale. **Yes ☐ No ☐ N/A ☐**

4.1020.2. The information shall be on or near the junction box nearest the point where the signal leaves the scale on an above-ground scale. **Yes ☐ No ☐ N/A ☐**

5. Additional Marking Requirements - Livestock, Vehicle, and Railway Track Scales

Code References: G-S.1., G-S.5.1., ~~and~~ S.6.3, S.6.4., and S.6.5.

No additional changes to this section.

6. Additional Marking Requirements - Force Transducers (Load Cells)

Code References: S.6., Table S.6.3.a., and Table S.6.3.b.

No additional changes to this section.

Proposed changes to ECRS Sections 5 and 7.

5. Identification

Code References: G-S.1., G-S.5.1., and S.6.3

Example Modular System: Point of sale systems may consist of a file server, CPU, keyboard, printer, display, and cash drawer. A file server, which performs metrological functions such as price computations, must be marked with the system make, model, and unique serial number with required prefix. File servers, which only store information processed by other components in the system, need not be marked in accordance with S.6.3.

"Dumb" indicators with no intelligence (such as remote displays on point-of-sale systems) do not require marking in accordance with S.6.3. unless they are the primary indicator for the system. Primary indicators must be marked with or display ~~have~~ a manufacturer's ID, model designation, serial number and prefix, accuracy class, and $n_{max.}$. The capacity by division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator ~~and capacity and division size (adjacent to the weight display)~~.

7. Marking Requirements

Code References: ~~S.6.1.,~~ S.6.2., S.6.3., ~~S.6.5.,~~ Table S.6.3.a. and Table S.6.3.b.

The weight display in a point-of-sale system must be marked with the scale capacity and the displayed scale division, regardless of the location of the weight display in the system. If the analog-to-digital converter for the scale is located in

the ECR, then the ECR must also be marked with the accuracy class and the operating temperature range of the weighing system if different from –10 °C to 40 °C (14 °F to 104 °F).

The lettering must be permanent as described in section 1, but the attachment of any badge or decal is slightly less stringent than for the G-S.1. information. In terms of attachment, any badge or decal must be "durable," that is, it must be difficult to remove (at all temperatures).

7.1. The capacity and value of the scale division shall be marked or indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator ~~adjacent to the weight display~~. **Yes ☐ No ☐ N/A ☐**

There are no additional changes recommended for Section 7.

Agenda Item 1 (d) Time Dependence (Creep Test) for Scales

58. Time Dependence Test for Scales and Separable Load-receiving Elements

Code References: T.N.4.5.1. and T.N.4.5.2.

This test shall be conducted on Class II, III, and IIII complete scales and weighing/load-receiving elements in a laboratory. The applied load shall be between 90 % and 100 % of capacity for scales with capacities of 2000 lb or less. For scales with capacities greater than 2000 lb, the load cell or load cells shall be tested individually. The test shall be conducted at the temperature extremes specified for the device under test (DUT).

For Class III L scales that cannot be tested in the laboratory, the load cell or load cells shall have an NTEP Certificate of Conformance and be suitable for the device(s) submitted for evaluation with respect to n_{max} v_{min} nominal capacity, maximum capacity, accuracy class, temperature limits, single or multiple load cell application, minimum dead load, and safe load limit.

58.1. ~~After the application of the load at constant test conditions, the indications after 20 seconds and 1 hour shall not differ by more than the absolute value of the applicable tolerance.~~ **Yes ☐ No ☐ N/A ☐**

Load the instrument close to Max. Take one reading as soon as the indication has stabilized and then note the indication in one hour intervals while the load remains on the instrument for a period of four hours. During this test the temperature should not vary more than 2 °C.

The test may be terminated after 30 minutes if the indication differs less than 0.5 e during the first 30 minutes and the difference between 15 and 30 minutes is less than 0.2 e.

If these conditions are not met, the difference between the indication obtained immediately after placing a load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.

58.2. The deviation in the zero indication before and after a period of loading with a load close to Max for half an hour, shall be determined. The reading shall be taken as soon as the indication has stabilized. **Yes ☐ No ☐ N/A ☐**

For multiple range instruments, continue to read the zero indication during the following 5 minutes after the indication has stabilized.

If the instrument is provided with zero-tracking, it shall not be in operation during

the test.

TIME DEPENDENCE TEST FORM
Code Reference: T.N.4.5.1.

Control No.: _____
Pattern designation: _____
Date: _____
Observer: _____
Verification scale interval e: _____ :
Resolution during test (smaller than e): _____ :

	At start	At max	At end	
Temp:				°C
Rel. h:				%
Time:				
Bar. Pres: (Only Class I)				hPa

Zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

$E = I + 0.5\ e - \Delta L - L$

Load L	Time of Reading	Indication I	Add. Load Δ L	Error	mpe
	Initial + 20 sec				
	5 min				
	15 min				
	30 min				
	If the difference between the indication obtained at 15 minutes and that at 30 minutes exceeds 0.2 e, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.				
	1 hr				
	2 hr				
	3 hr				
	4 hr				

15 to 30 min ☐ Passed ☐ Failed
0 to 30 min ☐ Passed ☐ Failed
0 to 4 hr ☐ Passed ☐ Failed ☐ Not Applicable

Time Dependence Zero Return

Zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

$P = I + 0.5\ e - \Delta L$

Time of Reading	Load L_0	Indication of zero I_0	Add. load Δ L	P
After loading for 30 minutes Load = _____				

Change of indication ΔP = _____

Check that $|\Delta P| \leq |MPE|$ for Class III L devices

Check that $|\Delta P| \leq 0.5\ e$ for Class II, III, and IIII devices

☐ Passed ☐ Failed

Meaning of symbols:
I = Indication
I_0 = Indication of no-load reference at the start of the test
L = Load
L_0 = Mass of no-load reference at the start of the test
Add. load Δ L = Additional load to next changeover point
P = Digital indication prior to rounding = I + 1/2 e - Δ L
E = Error = I - L or P - L
mpe = Maximum permissible error
EUT = Equipment under test

Remarks:

Agenda Item 1 (e) Time Dependence (Creep Test) for Load Cells

J. Tests to be Performed

1. Force transducer (load cell) error with respect to temperature.
2. Repeatability based on results of test 1.
3. Temperature effect on minimum dead load output.
4. Creep (30-minute ~~one hour~~ test per HB-44 or 30-minute test per OIML R 60).
5. Barometric pressure effect if the cell is sensitive to barometric pressure changes as determined by guidelines discussed in the section titled "Barometric Pressure Tests."

L. Tolerances

Table 3
Tolerance for Class III Force transducers (load cells)

Handbook 44 Reference	Single Cell Requirement		Multiple Cell Requirement	
Force transducer (load cell) Error Table 6, Class III; T.N.3.2., T.N.8.1.1.	**0.7 Factor Applied**		**1.0 Factor Applied**	
	Load	**Tolerance**	**Load**	**Tolerance**
	0 to 500 v	0.35 v	0 to 500 v	0.50 v
	501 to 2000 v	0.70 v	501 to 2000 v	1.00 v
	2001 to 4000 v	1.05 v	2001 to 4000 v	1.50 v
	4001 to 10 000 v	1.75 v	4001 to 10 000 v	2.50 v
Repeatability Error; T.N.5., T.N.8.1.1	**0.7 Factor Applied**		**1.0 Factor Applied**	
	Load	**Tolerance**	**Load**	**Tolerance**
	0 to 500 v	0.70 v	0 to 500 v	1.00 v
	501 to 2000 v	1.40 v	501 to 2000 v	2.00 v
	2 001 to 4000 v	2.10 v	2 001 to 4000 v	3.00 v
	4001 to 10 000 v	3.50 v	4001 to 10 000 v	5.00 v
~~Creep (test at 90-100% of force transducer (load cell) capacity); T.N.4.5.~~	~~**1.0 Factor Applied**~~		~~**1.0 Factor Applied**~~	
	~~**Load**~~	~~**Tolerance**~~	~~**Load**~~	~~**Tolerance**~~
	~~0 - 500v~~	~~0.50v~~	~~0 - 500v~~	~~0.50v~~
	~~501 - 2000v~~	~~1.00v~~	~~501 - 2000v~~	~~1.00v~~
	~~2001 - 4000v~~	~~1.50v~~	~~2001 - 4000v~~	~~1.50v~~
	~~4001 - 10 000v~~	~~2.50v~~	~~4001 - 10 000v~~	~~2.50v~~
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. T.N.8.1.1	0.7 v_{min} /5 °C		0.7 v_{min} /5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified force transducers (load cells) 1 v_{min} /1kPa		Applicable only to specified force transducers (load cells) 1 v_{min} /1kPa	

Table 4 Tolerance for Class III L Force transducers (load cells)				
Handbook 44 Reference	**Single Cell Requirement**		**Multiple Cell Requirement**	
Force transducer (load cell) Error Table 6, Class III L; T.N.3.2., T.N.8.1.1.	**0.7 Factor Applied**		**1.0 Factor Applied**	
	Load	**Tolerance**	**Load**	**Tolerance**
	0 v to 500 v	0.35 v	0 v to 500 v	0.50 v
	501 v to 1 000 v[1]	0.70 v	501 v to 1 000 v[2]	1.00 v
	[1]Add 0.35v to the tolerance for each 500v of load or fraction thereof up to a maximum load of 10 000v		[2]Add 0.50v to the tolerance for each 500v of load or fraction thereof, up to a maximum load of 10 000v	
Repeatability Error; T.N.5., T.N.8.1.1.	**0.7 Factor Applied**		**1.0 Factor Applied**	
	Load	**Tolerance**	**Load**	**Tolerance**
	0 v to 500 v	0.70 v	0 v to 500 v	1.00 v
	501 v to 1 000 v	1.40 v	501 v to 1 000 v	2.00 v
	9001 v to 9500 v	13.30 v	9001 v to 9500 v	19.00 v
	9501 v to 10 000 v	14.00 v	9501 v to 10 000 v	20.00 v
	[3]Add 0.70v to the tolerance for each 500 v of load or fraction thereof up to a maximum load of 10 000v		[4]Add 1.00v to the tolerance for each 500v of load or fraction thereof up to a maximum load of 10 000v	
~~Creep (test at 90 - 100% of force transducer (load cell) capacity); T.N.4.5.~~	~~**1.0 Factor Applied**~~		~~**1.0 Factor Applied**~~	
	~~**Load**~~	~~**Tolerance**~~	~~**Load**~~	~~**Tolerance**~~
	~~0 - 500v~~	~~0.25v~~	~~0 - 500v~~	~~0.25v~~
	~~501 - 1000v~~	~~0.50v~~	~~501 - 1000v~~	~~0.50v~~
	~~9001 - 9500v~~	~~4.75v~~	~~9001 - 9500v~~	~~4.75v~~
	~~9501 - 10 000v~~	~~5.00v~~	~~9501 - 10 000v~~	~~5.00v~~
	~~[5]Add 0.25v to the tolerance for each 500v of load or fraction thereof up to a maximum load of 10 000v~~			
Temperature Effect on Minimum Dead Load Output; T.N.8.1.3. T.N.8.1.1	2.1 v_{min} /5 °C		2.1 v_{min} /5 °C	
Effects of Barometric Pressure; T.N.8.2.	Applicable only to specified force transducers (load cells) 1 v_{min} /1kPa		Applicable only to specified force transducers (load cells) 1 v_{min} /1kPa	

II. Determination of Creep

1. At 20 °C ambient, insert the force transducer (load cell) into the force generating system and load to the minimum dead load. If Procedure I. (which includes increasing and decreasing load tests) has just been completed, wait 1 hour. If a separate creep test is being conducted, exercise the force transducer (load cell) as in Procedure I.5 and then wait 1 hour.

2. If the indicating element for the force transducer (load cell) is provided with a convenient means for checking itself, conduct the self-test at this time.

3. Monitor minimum load output until stable.

4. ~~There are two test methods to determine the creep characteristics of force transducers (load cells). The 1 hour creep test at the maximum load (step 4. (a)) is the preferred form of the creep test; run the return to zero creep test (step 4. (b)) only when justified by limitations in the test equipment. The NTEP will conduct step 4. (a) creep tests whenever possible.~~

~~Take readings at 1 minute time intervals for the first 10 minutes and every 10 minutes thereafter.~~

a. **Test for Creep:** Apply a load equal to 90 % to 100 % of the maximum capacity of the force transducer (load cell) and record the indication 20 seconds after reaching the load. The time to load test weights and read the indicator shall be as short as possible and shall not exceed the time specified in Table 5. With the load remaining on the load cell, c~~C~~ontinue to record indications periodically, thereafter at time intervals over a 30 minute ~~1 hour~~ period.

Note: A 30-minute test is acceptable if the creep test is performed in accordance to OIML R 60 tolerances.

b. Remove a load equal to 90 % to 100 % of the maximum capacity of the force transducer (load cell) that has been applied for ~~1 hour~~ 30 minutes. Record the indication after 20 seconds. The time to unload test weights and read the indicator shall be as short as possible and not exceed the time specified in Table 5. Continue to record indications periodically thereafter at time intervals over a 1 hour period (or 30 minutes if the creep test is conducted according to OIML R 60 requirements).

Table 5
Loading Times

Load		Time
Greater than	**To and including**	
0 kg	10 kg	10 s
10 kg	100 kg	15 s
100 kg	1 000 kg	20 s
1 000 kg	10 000 kg	30 s
10 000 kg	100 000 kg	50 s
100 000 kg	----------	60 s

5. Repeat the operations described in steps 2 through 4 at the high and low temperature limits for the accuracy class.~~,~~ ~~i~~If the manufacturer has specified a smaller or a larger range, repeat operations at the limits marked on the cell, provided the temperature range is at least the range required for the accuracy class.

6. With the resulting data, and accounting for the effect of barometric pressure changes, determine the magnitude of the creep and compare it to the tolerance in NIST Handbook 44 Scales Code Table T.N.4.6.2

Table T.N.4.6.
Maximum Permissible Error (mpe) * for Load Cells
During Type Evaluation

pe in Load Cell Verifications Divisions (v) = p_{LC} x Basic Tolerance in v				
Class	p_{LC} x 0.5 v	p_{LC} x 1.0 v		p_{LC} x 1.5 v
I	0 v to 50 000 v	50 001 v to	200 000 v	200 001 v +
II	0 v to 5 000 v	5 001 v to	20 000 v	20 001 v +
III	0 v to 500 v	501 v to	2 000 v	2 001 v +
IIII	0 v to 50 v	51 v to	200 v	201 v +
III L	0 v to 500 v	501 v to	1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)

v represents the load cell verification interval
p_{LC} represents the apportionment factors applied to the basic tolerance
p_{LC} = 0.7 for load cells marked with S (single load cell applications)
p_{LC} = 1.0 for load cells marked with M (multiple load cell applications)
* mpe = p_{LC} x Basic Tolerance in load cell verifications divisions (v)

Agenda Item 11. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically

The Weighing Sector recommendation to amend Publication 14 Performance and Permanence Testing for Railway Track Scales in Agenda Item 11 was modified as follows according to the results of a November 10, 2005.

The NIST Technical Advisor reported the results of the ballot, including comments, to the Sector and NTEP Committee prior to the 2006 NCWM Interim Meeting.

69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically

*(**NOTE:** For combination vehicle/railway track scales, see also additional test considerations under "Test Considerations for Other Scales" in the application.)*

It is desirable, but not required, that a new installation should be calibrated by a railroad test car after a representative of the railroad has inspected the installation for compliance with railroad design and construction specifications. A 100 000 lb field standard weight cart, or a combination of field standard weights ***safely*** added to a field standard weight cart for a total of 100 000 lb, will be used to conduct the initial NTEP calibration and test.

The permanence test shall not be conducted sooner than thirty (30) days after the initial NTEP test. If a 100 000 lb field standard weight cart, or a combination of field standard weights ***safely*** added to a field standard weight cart for a total of 100 000 lb, is not available for the subsequent permanence verification a 100 000 lb capacity railroad scale test car of may be used.

***NOTE:** A field standard weight cart shall have a footprint no greater than 7', which is the size of the footprint of railway track test weight cars. [The Association of American Railroad Scale (AAR) Handbook 2005 Revision © requirements for "standard railway track scale test weight car" can be found in AAR Handbook for Scales Sections 1.5. through 1.5.5. A standard rail car, as described in AAR Handbook Section 1.5.6., is not suitable for use during NTEP evaluations since the entire load of the rail car can not be concentrated in a footprint no greater than 7".]*

Performance tests are conducted to determine compliance with the tolerances and, in the case of nonautomatic indicating scales, the sensitivity requirements specified in NIST Handbook 44. The tests described here apply primarily to the weighing/load-receiving element. It is assumed that the indicating element used during the test has already been examined and found to comply with applicable requirements. If the design and performance of the indicating element is

to be determined during the same test, the applicable requirements for weighbeams, poises, dials, electronic digital indications, etc., must also be referenced.

69.1. Influence Factors

If tests are necessary to determine compliance with influence factors, individual main elements and components tests must be conducted according to NTEP Policy that is outlined in NCWM Publication 14, Section B.1.Influence Factor Requirements.

69.2. Test Standards

~~The~~ A 100 000 lb field standard weight cart or a 100 000 lb combination of field standard weights safely added to a field standard weight cart ~~GIPSA-type or equivalent test car or 100 000 lb field standard weight carts (see Handbook 44 Scales Code paragraph N.3.2.)~~ shall be used for the initial test ~~using a minimum of 100 000 lb~~ of known test weights, ~~generally~~ in increments of 10 000 lb. Railroad test weight cars shall not be used ~~exclusively~~ for the initial test.~~, but may be used as part of a substitution of strain load tests.~~

69.3. Sensitivity and Discrimination Tests

69.3.1. Weighbeams

The sensitivity test is conducted at zero load and at maximum load. The sensitivity test is conducted by determining the actual test weight value necessary to bring the beam from a rest point at the center of the trig loop to rest points at the top and bottom of the trig loop. The maximum load at which the sensitivity test is conducted need not be comprised of known test weight.

69.4. Digital Indications

Width-of-zero, zone of uncertainty, and automatic-zero-setting mechanism (if so equipped) tests shall be conducted as specified in other sections of NCWM Publication 14 ~~this Handbook~~.

69.5. Increasing Load and Section Tests

69.5.1. ~~With the test car off one end of the scale, remove weights from car and place on the end (closest section) of the scale.~~A minimum of three observations shall be made ~~at~~ with test weight loads of at least 30 000 lb, 40 000 lb and 50 000 lb ~~test loads~~ moving test cart across the scale in both directions.[12] Readings may be taken at 10 000 lb and 20 000 lb increments. Additional observations shall be made with ~~the~~ a 50 000 lb test weight load. Remove test weight load from scale before moving in opposite direction and ~~farthest section,~~ record any zero balance change. ~~, z~~Zero the scale if necessary, and repeat this test moving the weights in the opposite direction. When the weights have been returned to the starting point ~~the near section near the test car,~~ apply additional loads, making observations in increments equal to the value of each test weight (10 000 lb) up to 100 000 lb at each end if practical. Repeat tests with the load concentrated to the right and left over each section and midway between sections in both directions.

69.5.2. The results shall be within acceptance tolerance.

69.6. Strain Load Tests

The minimum test load for a strain-load test for single-load-receiving element ~~platform~~ scales greater than 35 feet and for multiple- load-receiving element ~~platform~~ scale systems designed to weigh railroad cars in a single draft is 200 000 lb.

69.6.1. .Place a strain load ~~(as a minimum, use the GIPSA or a GIPSA-type test car without weights)~~ on the scale so that the test load can be placed on one end section and observe the weight to the smallest increment practical. Add a test weight load(s) to end section. ~~If practical, repeat this test on the other end section.~~

Remove the test load, observing any balance change, then remove the strain load. If practical, repeat this test on the other end section. Conduct any sensitivity and discrimination tests at maximum load.

~~69.6.2. Place the strain load and the empty GIPSA or GIPSA type test car on the load receiving element platform so that the weights can be incrementally loaded from the weight cart, which remains off the platform. Observe weight to the smallest increment practicable. Load the test car with the test weights. Observe weight indications in increments equal to each added test weight (10 000 lb). At this maximum load, sensitivity and discrimination tests should be conducted.~~

~~69.6.3.~~ 69.6.2. The results of all observations shall be within acceptance tolerance.

69.7. Permanence Test

~~The permanence test shall be conducted after a minimum of 20 days after successful completion of the initial performance test.~~ It is recommended that the performance tests described above be repeated. However, ~~it~~ if the original test cart (and additional field standards if applicable) is not available, the test may be conducted to the extent possible with a~~t~~ standard railway track scale test weight car with at least a 100 000 lb capacity and a suitable and current calibration report. ~~least two railroad test weight cars.~~The results of this test must be within acceptance tolerance.[13] ~~–~~If the device does not meet these tolerance limits the scale will be rejected and the entire test must be repeated, including successful initial performance testing and a subsequent test after a minimum of 30 days.

69.7.1 Minimum Use Requirements for the Field Permanence Test

69.7.1.1 There must be at least 300 weighing operations executed over the scale prior to conducting the type evaluation permanence test. The permanence test should be performed at a customer location to be able to evaluate "normal" use.

69.7.1.2 The minimum time period of use is 30 days with a minimum of 300 weighing operations as described below. The subsequent permanence test should be tentatively scheduled when the initial test is started. If the 300 weighing operations have not been completed by that time, the time for the field permanence test shall be extended until at least 300 weighing operations have been completed. The second phase of the permanence test can be conducted as soon as 300 weighing operations have been achieved, but no sooner than 30 days after the initial test of the field permanence test. Acceptance tolerances apply regardless of the length of the test.

69.7.1.3 Only loads, which reflect "normal" use, will be counted during the permanence-testing period.
- 100 % of the loads must be above 20 % of scale capacity; and
- 50 % of the loads must be above 50 % of scale capacity.

The scale may be used to weigh other loads, but only the loads specified above are counted as part of the permanence test.

69.7.2 Subsequent Type Evaluation (Field) Permanence Test

A minimum of two increasing-load, two decreasing-load, and two section tests are to be conducted a minimum of 30 days after the initial tests. However, if the original field standard weight cart is not available, the test may be conducted to the extent possible with at least one railroad test car~~s~~. Strain load tests shall be conducted with a minimum 200 000 lb test load. If the test results are at or near acceptance tolerance limits, at least one more set of tests should be conducted immediately to verify the test results and determine device repeatability.

Repeat width-of-zero, zone of uncertainty, sensitivity, and discrimination tests near zero (outside the range of the AZSM) and at or near capacity on the subsequent tests.

If the device does not meet these tolerance limits, the entire test must be repeated, including successful initial performance testing and a subsequent test after a minimum of 30 days and an additional 300 weighing operations as described in the criteria above.

[12] Do not exceed section capacity
[13] ~~If the subsequent performance test cannot be completed within 30 days because of the unavailability of test cars, maintenance tolerance will be applied.~~

Agenda Item 12. Cash Acceptors or Card-activated Systems

Publication 14 ECRS, Section 13. Cash Acceptors or Card-activated Systems

Code References: G-S.2., G-S.5.1., G-S.6

(Note: Language changes and additions approved by the 2005 NTEP Committee are indicated in shaded, ~~strike out~~, and underlined text. Language changes and additions recommended by the Weighing Sector are indicated in **bolden, ~~strike out,~~ and underlined** text.)

13.6.	Printed Receipt - A printed receipt must be available to the customer from the device at the completion of the transaction.	**Yes ☐ No ☐ N/A ☐**
13.7.	**~~Because the customer must be provided with a receipt,~~ tT**he system must not accept cash if sufficient paper is not available to complete the transaction.	**Yes ☐ No ☐ N/A ☐**
13.8	The cash acceptor must not initiate a cash **or card** transaction if **one ~~either~~** of the following conditions are true:	**~~Yes ☐ No ☐ N/A ☐~~**
	• no paper is in the receipt printer of the cash **or card** acceptor;	**Yes ☐ No ☐ N/A ☐**
	• insufficient paper is available to complete a transaction; or	**Yes ☐ No ☐ N/A ☐**
	• the ECR receipt must be capable of being recalled and printed on a different printer. Instructions shall be displayed on the customer display or printed (if there is sufficient paper) directing the customer to see the store attendant or manager for a printed copy of the receipt.	**Yes ☐ No ☐ N/A ☐**
13.9.	Instructions must be marked on the device to inform the customer how to operate the cash **or card** acceptor.	**Yes ☐ No ☐ N/A ☐**
13.10.	Means must be provided for the customer to cancel the transaction at any point.	**Yes ☐ No ☐ N/A ☐**
13.10.1.	If the customer cancels the transaction by pressing the cancel key (or equivalent key(s)), after the cash has been accepted, the device must either:	
13.10.1.1.	be equipped with means for the customer to retrieve the cash inserted from the device, AND automatically issue a printed receipt indicating the amount of cash tendered and the amount returned, OR	**Yes ☐ No ☐ N/A ☐**
13.10.1.2.	display instructions (such as "sale **canceled ~~terminated~~,** see attendant," "sale **canceled ~~terminated~~,** get receipt" or similar wording) for the customer to see the attendant, AND automatically issue a printed receipt showing the amount of cash inserted by the customer, a statement indicating that the sale was **canceled ~~terminated~~,** and instructions for the customer to see the attendant.	**Yes ☐ No ☐ N/A ☐**
13.11.	Means must be provided for the customer to retrieve correct change if the device has insufficient money to return to the customer. The device must display instructions (such as "insufficient change, see	**Yes ☐ No ☐ N/A ☐**

attendant," or similar wording) directing the customer to see the attendant, AND

Automatically issue a printed receipt showing the amount of cash inserted by the customer, a statement indicating that the sale was **canceled** ~~**terminated**~~**,** and instructions for the customer to see the attendant.

Note: It is acceptable for different messages to be used when providing instructions to the customer. This depends upon whether the transaction is terminated by use of the cancel key, insufficient receipt paper, or insufficient change (e.g., "sale terminated, get receipt," or "sale terminated, see cashier," or "change due, see cashier").

Agenda Item 14. CLC for Combination Railway Track/Vehicle Scales

8.3. Modular Load-Cell Vehicle, Livestock, or Railroad Track Scales

***NOTE**: These criteria apply if the scale is fully electronic (i.e., load cells comprise the sensors of the weighing/load-receiving element) and is of a modular design.*

Modular Scale. A vehicle, livestock, or railroad track scale made up of individual load-receiving elements of like design, which can be joined together to form a larger integral load-receiving element and can be separated at any time without structurally changing the individual load-receiving elements. This definition is to be applied for all new type evaluations and for applications to add new devices to an existing CC (see Figure 3).
(Effective January 2001)

8.3.1. Modular Scale to be Tested

The following criteria must be satisfied in the scale design and the scale to be tested:

a. Load cells of the same design and capacity that consists of simply attaching modules together must be used throughout the family. If load cells of different capacities are used for scales of different structural design ~~weighbridge~~ strength and nominal capacity in the family of scales, then the module using the higher capacity load cells must be evaluated.

~~b. CLC in the family must be not less than 40 percent of the sum of the capacity of two load cells or 80 percent of the capacity of one cell.~~

~~c.~~ b. A scale with at least two modules must be tested. The module with the largest CLC is to be tested. If the longest span between sections is not tested, the CC will include up to 120 % of the span between sections that was tested. Arrangements regarding the specific scale in the family to be tested will be established in consultation with NTEP representatives.

Agenda Item 15. Abbreviations for Carat and Count in Publication 14 Sections 38 and 76.

38. Counting Feature on Class I or II Scales Used in Prescription Filling Applications

38.3. The scale display differentiates between count indications and weight indications. (See Section 76 for acceptable abbreviations and symbols) **Yes □ No □ N/A □**

38.3.1. The abbreviation or symbol "pc(s)," "ct," or "cnt" may be used to identify count or pieces. **Yes □ No □ N/A □**

38.3.2. If abbreviation or symbol "ct" is used to identify count, ~~in a separate display for other than weight information, the "ct" or "c" shall not be~~ it is not used to identify carat in the ~~weight display~~ weighing mode. **Yes □ No □ N/A □**

~~38.3.3. If symbol "ct" is used to identify count in a shared or combined display, the same abbreviation "ct" or "c" for carat shall not be used to identify the carat unit of measure and count.~~ **Yes □ No □ N/A □**

38.4. Values must be identified with an adequate ~~the~~ word, abbreviation, or symbol ~~for pieces (pcs) or count (ct).~~ If the symbol ∴ shown in Section 76. Table of Acceptable Abbreviations/Symbols is used and is intended for the customer, it cannot be used without additional description, marks, or directions displayed or marked on the device). **Yes □ No □ N/A □**

76. List of Acceptable Abbreviations/Symbols

Device Application	Term	Acceptable	Not Acceptable
General:	Piece(s)	Pieces, pc, or pcs	
	Count	count, cnt, or pc(s), is encouraged for symbol for pieces. ct is acceptable (HB-130)	c
Values Defined:	Other symbols	General Table of Weights And Measures, HB-44*	
Values Defined (cont)	carat carat or carat troy = 200 mg	c (HB-44 and NIST Guide for the Use of the International System of Units (SI) by B. N. Taylor) ct (common jewelry industry terminology and is only acceptable by Canada)	ct (is not permitted if used as the abbreviation for carat and count on a scale with an enabled count feature)
***Exceptions to Gen'l Tables of W&M, HB-44:**	carat carat or carat troy = 200 mg	ct, ~~c~~ (common jewelry industry terminology)	ct (is not permitted if used as the abbreviation for carat and count on a scale with an enabled count feature)
	U.S. short ton	Ton or TN	

Agenda Item 16. Performance and Permanence Test for Bench and Counter Scales

63. Performance and Permanence Tests for Counter (Bench) Scales (Including Computing Scales)

63.6.5. Test load:

63.6.5.1. For laboratory tests of scales with a capacity of 1 000 lb or less, the test load required for the permanence test is 50 % of maximum capacity, distributed uniformly over the load points of the scale.

63.6.5.2. For laboratory tests of scales with a capacity greater than 1 000 lb, the test load required for the for the permanence tests is 250 kg (550 lb), distributed uniformly over the load points of the scale.

63.6.10. Step 4: Apply a test load of 50 % capacity, not to exceed 250 kg (550 lb), approximately 25 000 times. It is recommended that the frequency and speed of application of the load shall allow the instrument to come to rest both when loaded and unloaded.

Agenda Item 18. AWS Influence Factor Temperature Ranges that Exceed –10 °C to 40 °C

B. Certificate of Conformance Parameters

1. Influence Factors Requirements

Although NIST Handbook 44 contains a set of influence factors requirements, not all devices must be tested for all of the influence factors. The following table identifies the influence factor tests to be conducted on various devices. The main elements and components (indicating elements and load cells) of scales with a capacity greater than 2000 lb must be tested separately for compliance with the influence factors requirements.

Devices To Be Tested For Influence Factors							
Device Type	Temperature Accuracy [7]	Temp. Zero Drifts	Barometric Pressure	Warm-up Time	Voltage[4]	Power Interruption[5]	Time Dependence
Scales ≤ 2000 lb	X	X	X[1]	X	X	X	X
. . .							
Load Cells							
. . .							

[1]Testing is limited to some canister load cells.
[2]Compliance with influence factors requirements will be determined according to existing NTEP policy.
[3]Test limited to power switch only, not to initial plug-in of the device.
[4]Voltage test is 130 and 100 VAC and low battery test on DC. (See Section K 60.)
[5]Power interruption is pulling the plug for 10 seconds. (See Section K.19.)
[6]Indicating elements processing only digital information do not have to be tested for compliance with the influence factors.
[7]Compliance with temperature requirements by NTEP is limited to temperatures that are no lower that –10 °C and no higher than 40 °C.

59. Test Procedures for Influence Factors

Introduction

Influence factors are variables in the environment that might affect the performance of a scale, especially the accuracy and sensitivity (or discrimination) of the device. The T.N.8. section of the Scales Code in Handbook 44 specifies performance requirements for scales over given ranges. The test equipment, (e.g., thermometers, hygrometers, timing devices) must be sufficiently accurate that their errors do not contribute significantly to the measurement results. The environmental chamber must satisfy specified conditions. In general, good laboratory practices must be followed.

The test procedures of the International Electrotechnical Commission are excellent background material and provide guidance for performing the influence factors tests. The use of these documents is encouraged. Compliance with temperature requirements by NTEP is limited to temperatures that are no lower that –10 °C and no higher than 40 °C.

Not all devices are affected…

Appendix B
2005 Weighing Sector Meeting Attendees

Cary Ainsworth c/o USDA GIPSA
75 Spring Street, #230
Atlanta, GA 30303-3309
(404) 562-5840, FAX: (404) 562-5848
e-mail: L.Cary.Ainsworth@usda.gov

Joseph Antkowiak Flintec, Inc.
18 Kane Industrial Drive
Hudson, MA 01749
(978) 562-7800, FAX: (978) 562-0008
e-mail: jantkowiak@f1intec-us.com

William E. Bates
USDA,GIPSA, FMD, PPB
1400 Independence Avenue SW/STOP 3630
Washington, DC 20250-3630
(202) 690-0961, FAX: (202) 720-1015
e-mail: william.e.bates@usda.gov

Andrea P. Buie
Maryland Dept. of Agriculture
50 Harry S Truman Parkway
Annapolis, MD 21401
(410) 841-5790, FAX: (410) 841-2765
e-mail: buieap@mda.state.md.us

Luciano Burtini
Measurement Canada
2008 Matera Avenue
Kelowna, British Columbia, Canada V1V 1W9
(250) 862-6557, FAX: (250) 712-4215
e-mail: burtini.luciano@ic.gc.ca

Gary Castro
California Division of Measurement Standards
6790 Florin Perkins Road, Suite 100
Sacramento, CA 95828
(916) 229-3049, FAX: (916) 229-3026
e-mail: gcastro@cdfa.ca.gov

Steven E. Cook
NIST, Weights & Measures Division
100 Bureau Drive MS 2600
Gaithersburg, MD 20899-2600
(301) 975-4003, FAX: (301) 926-0647
e-mail: steven.cook@nist.gov

Scott Davidson
Mettler-Toledo, Inc.
1150 Dearborn Drive
Worthington, OH 43085
(614) 438-4387, FAX: (614) 781-7484
e-mail: scott.davidson@mt.com

Terry Davis
Kansas Dept. of Agriculture
PO Box 19282/Forbes Field Building 282
Topeka, KS 66619-0282
(785) 862-2415, FAX: (785) 862-2460
e-mail: tdavis@kda.state.ks.us

Robert K. Feezor
Norfolk Southern Corporation
1200 Peachtree, Box 142
Atlanta, GA 30309
(404) 527-2537, FAX: (404) 527-2589
e-mail: rkfeezor@mindspring.com

Darrell E. Flocken
Mettler-Toledo, Inc.
1150 Dearborn Drive
Worthington, OH 43085
(614) 438-4393, FAX: (614) 438-4355
e-mail: darrell.f1ocken@mt.com

Sara Garverick
Air Force Metrology & Calibration
813 Irving Wick Drive W., Bldg. 2
Heath, OH 43056
(740) 788-5009, FAX: (740) 788-5036
e-mail: sara.garverick@afmetcal.af.mil

Scott Henry
NCR Corporation
2651 Satellite Blvd
Duluth, GA 30096
(770) 623-7543, FAX: (770) 479-1174
e-mail: scott.henry@ncrcom

Michael Kelley
Ohio Department of Agriculture
8995 East Main Street, Building 5
Reynoldsburg, OH 43068-3399
(614) 728-6290, FAX: (614) 728-6424
e-mail: kelley_laptop@mail.agri.state.oh.us

Gary Lameris
Lameris Consulting
220 Burgess Avenue
Dayton, OH 45415
(937) 274-1812
e-mail: glameris@yahoo.com

Stephen Langford
Cardinal Scale Manufacturing Co.
203 East Daugherty, P.O. Box 151
Webb City, MO 64870
(417) 673-4631, FAX: (417) 673-5001
e-mail: slangford@cardet.com

Paul A. Lewis, Sr.
Rice Lake Weighing Systems
230 West Coleman Street
PO Box 272
Rice Lake, WI 54868-2404
(715) 234-3494, FAX: (715) 234-6967
e-mail: paulew@rlws.com

Todd R. Lucas
Ohio Dept. of Agriculture
8995 East Main Street, Building 5
Reynoldsburg, OH 43068
(614) 728-6290, FAX: (614) 728-6424
e-mail: lucas@mail.agri.state.oh.us

L. Edward Luthy
Brechbuhler Scales Inc
1424 Scale Street
SW Canton, OH 44706
(330) 458-2424, FAX: (330) 458-3068
e-mail: eluthy@brechbuhler.com

Angelique McCoy
Ohio Department of Agriculture
8995 East Main Street, Building 5
Reynoldsburg, OH 43068-3399
(614) 728-6290, FAX: (614) 728-6424
e-mail: mccoy@mail.agri.state.oh.us

Don Onwiler
Nebraska Division of Weights & Measures
301 Centennial Mall South, Box 94757
Lincoln, NE 68509
(402) 471-4292, FAX: (402) 471-2759
e-mail: donlo@agr.state.ne.us

Stephen Patoray
National Conference on Weights & Measures
1239 Carolina Drive
Tryon, NC 28782
(828) 859-6178, FAX: (828) 859-6180
e-mail: spatoray@mgmtsol.com

Frank Rusk Coti, Inc.
122 Export Circle
Huntsville, AL 35806
(256) 859-6010, FAX: (256) 859-5024
e-mail: frankjrusk50@hotmail.com

Milton Smith
Measurement Canada Standards Bldg #4,
Tunney's Pasture, Holland Ave.
Ottawa, Ontario, Canada K1A OC9
(613) 952-0656, FAX: (613) 952-1754
e-mail: smith.milton@ic.gc.ca

Louis E. Straub
Fairbanks Scales, Inc.
3056 Irwin Drive
SE Southport, NC 28461
(910) 253-3250, FAX: (910) 253-3250
e-mail: strauble@yahoo.com

James C. Truex
Ohio Department of Agriculture
8995 East Main Street, Building 5
Reynoldsburg, OH 43068-3399
(614) 728-6290, FAX: (614) 728-6424
e-mail: truex@mail.agri.state.oh.us

William West
Ohio Department of Agriculture
8995 East Main Street, Building 5
Reynoldsburg, OH 43068-3399
(614) 728-6290, FAX: (614) 728-6424
e-mail: west@mail.agri.state.oh.us

Juana Williams NIST
100 Bureau Drive MS 2600
Gaithersburg, MD 20899-2600
(301) 975-3989, FAX: (301) 926-0647
e-mail: juana.williams@nist.gov

Russ Wyckoff
Oregon Dept. of Agriculture
635 Capitol Street, N.E.
Salem, OR 97301-2532
(503) 986-4767, FAX: (503) 986-4784
e-mail: rwyckoff@oda.state.or.us

Jesus P. Zapien
A&D Engineering Inc
1555 McCandless Drive Milpitas, CA 95035
(408) 518-5114, FAX: (408) 635-2314
e-mail: jzapien@andweighing.co